HYGIENE
AND
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BY

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PREFACE

THE aim of this book has been to present a broad picture of hygiene in theory and practice as it is understood today. It is concerned, therefore, not only with the measures advocated for the prevention of ill-health, but also with the principles that apply to the attainment and preservation of good health, both of the mind and the body. Thus, in the main, it gives an account of some of the ways in which man is influenced by his surroundings, and of the means by which he should strive to come to terms with them by personal endeavour and by taking advantage of the many services available to assist him. In brief, it is a guide to wise living and a healthy way of life. *It is hoped therefore that it will be read with these objects in mind, and looked upon as a health guide-book, which will help readers to think about these matters themselves, rather than as a purely instructional text-book.*

An attempt has been made—without delving too deeply into technicalities—to set down the main facts of a many-sided subject in a way which will be acceptable to both adults and young people in different sections of the community. It is hoped that the book may prove of practical interest to leaders of youth movements, and others engaged in community activities as well, serving as a basis for instructional programmes; for a good background knowledge is the foundation on which the health of the individual rests, and this, in turn, governs the well-being and prosperity of a community.

We live in a changing world. The environment of today is very unlike that of yesterday: for the most part the transformation has been for the better, in some respects for the worse. These changes affect everyone, and, directly and indirectly, have far-reaching effects on health standards. They must also determine the line of approach to health promotion and sickness prevention. This need to move with the times—indeed, for keeping a step or two ahead—has been a guiding principle in public health reform since it began in Britain, after a long delayed start, over a hundred years ago. Social reformers, humanitarians, writers and doctors have all played a part in the march of health progress, and by influencing public

opinion, have acted as a spur to subsequent legislation. But there has been little respite: as one set of situations is studied and handled, others, needing a different strategy, loom ahead, many of them awaiting further knowledge and the forging of new weapons before they can be dealt with effectively. The common denominator to most health problems—if it is possible to give one—is the degree of participation of the citizen.

It will be evident that in order properly to appreciate the principles of hygiene in its modern cloak, it is of advantage to know a little about its past history. This book contains many references to the past, which show the magnitude of the task confronting the pioneers, who were without any certain knowledge of how disease was caused; these references should also help to draw a picture of the steady progress made, and the manner in which it was brought about.

In addition, they demonstrate, by contrast, the great potential power of the weapons in the modern preventive armoury, among which may be cited better education, improved social circumstances, a more nutritious diet, early and successful treatment, immunisation, new insecticides, and a comprehensive health service.

The early public health service was built on "the sanitary idea", the chief components of which were proper sanitation, pure food and water, better housing, cleanliness, and disinfection. A vigorous onslaught was made on the infectious diseases—the killers of the age—with undeniable success. Later on, the concept widened to embrace personal health and the welfare of the mother and child; and health visitors came on the scene to make a signal contribution to their better health—notably to the progressive fall in the number of infant deaths. The poor physical standards of Army recruits at the turn of the century, brought the school medical service into being a few years later: together with the provision of school meals and milk, it stands out as a great landmark in public health progress. Now, the preventive outlook is turning more and more towards the non-infective diseases—cancer, rheumatism, coronary disease, bronchitis, in particular—which give rise to most deaths and cause a great amount of ill-health.

The prevention of mental illness, to which there is at last a more rational and co-ordinated approach than formerly, will receive even

greater attention in the immediate future under the stimulus of recent legislation. At the same time the physically as well as the mentally handicapped are being given more consideration and assistance than they have ever known—in consequence, many of them are now enabled to play their part as "normal" citizens. Rehabilitation of the sick and injured has been a prominent feature of post-war medicine, and occupational therapy has established itself firmly as an adjunct to medical treatment.

Among the diverse matters which are included in the province of the new hygiene, are the abatement of smoke and noise, accidents in the home, the welfare of old people and the widening use of radioactive substances. These, and the other public health problems, have to be looked at against a background of changing habits and outlook, in an age of speed, tension and no little unrest. At the same time, the age-grouping of the population is altering, and its composition is being influenced by movement of people in and out of the country. This migration is always going on, and it has had prominent consequences on many previous occasions in our history.

Health education—the art of informing the public rationally and effectively—has taken on a completely new-look in the past decade: it forms the very core of hygiene practice, and so important is it, that it is considered in some detail here.

The structure of the public health service (portrayed diagrammatically at the end of the book) has also changed, both in scope and in the number and activities of its staff. There are now closer links with other branches of medicine. The health visitors' responsibilities have expanded to embrace the whole family unit; the sanitary inspector is now more correctly named the "public health inspector"; and an army of domestic helps has come into being since 1948. It must be emphasised that there are many other agencies at work, within and without the national health service; all contributing, all helping to keep the wheels of the complicated preventive machine in motion. It is not only the doctors, medical auxiliaries and social workers who so function, they need the technical assistance of members of the other professions, and the support of voluntary organisations—in fact, everyone who prosecutes the art of living healthily and fosters what a famous man described as "the enthusiasm of humanity", is in the partnership.

Inevitably in a book of this nature there are many references to

disease and pestilence, but it is anticipated that attention will be focused on health rather than on ill-health, and that a broad, well-balanced attitude will be adopted towards the risks of the occurrence of illness. Periodic minor departures from health are, of course, almost unavoidable still, but major sickness is relatively infrequent, and advances in its treatment are being made almost daily. At no time have facilities for prevention, early diagnosis, and medical and surgical cure been more efficient, and there has never been a greater incentive to reduce the amount of avoidable illness and injury, which causes the unnecessary occupation of hospital beds and takes up, needlessly, so much medical and nursing time.

If this book helps members of the public to understand something of the principles on which good health is founded, so that they themselves may make a fuller contribution to its attainment, it will have succeeded in its purpose.

While the book is intended to be read as a whole, it has been planned so as to allow individual chapters on special aspects of public health work to be read separately. There is inevitably, therefore, a good deal of repetition in the text. The chapters may, however, be linked (as indicated on page 5) to enable the book to be used as a training aid, for 6 or 12 classes in hygiene and public health.

CHAPTER I

INTRODUCTORY

1. HYGIENE: DEFINITION

The word "Hygiene" is derived from *Hygeia* the Goddess of Health in Greek mythology. It has been used for many years to denote the science of health, which has as its aim the prevention of disease and the preservation of health. "Sanitation", from the Latin word *sanitas*, has much the same meaning; but nowadays its use has come to be more restricted, and it usually refers to the means taken to keep a place healthy, particularly in connection with water supplies and the removal of human and domestic waste products. It is most important to remember that the practice of hygiene depends for its success on a knowledge of many other arts and sciences and other branches of medicine. These include physics, chemistry, meteorology, geology, engineering, as well as bacteriology, physiology, psychology and curative medicine. Over the years, a great deal of information as to the causes of ill-health (and, thus, as to the best ways of preventing it) has been accumulated, and with this increase of knowledge, it has become clear that the hygienist must seek the aid of the experts in many walks of life; indeed, there are not many whose help and close co-operation he can afford to ignore.

2. THE PUBLIC HEALTH SERVICE

The public health service which began in this country just over a hundred years ago, has played an outstanding part in raising the standard of health. Its organisation and functions are outlined diagrammatically in the Appendix. But, however efficient it may be, a public health service, if it is to achieve the best possible results, must have the full support of members of the public; in fact, everyone is a member of the health team. Good health is a foundation of national prosperity, and this enables social improvement to take place, which, by providing better houses, nutrition, education, working conditions and medical and social services, paves the way to still better health.

3. PREVENTIVE MEDICINE AND POSITIVE HEALTH

In its early days the main battle of the public health service was against infectious diseases. These diseases flourished in insanitary surroundings. Dirt, overcrowding, ignorance, intemperance, impure food and water, were their allies; and so were animals and insects that acted as their carriers. Slowly, but surely, the fight against many of these infections is being won, but a lot remains to be done. Important though it is to **prevent** the occurrence of illness, it is now realised that there is a need to do more than this. Absence of disease does not necessarily mean good health: a more **positive** approach is required, which has as its aim the raising of the standard of health in the individuals making up a community so that they achieve the best possible degree of fitness and well-being. Today, and to an ever increasing extent, more and more regard is being paid to mental, in addition to physical fitness, and what is sometimes spoken of as **positive health** now includes the health of the mind as well as the body.

The scope of public health work is expanding all the time. Particular attention has to be directed to the virus diseases—of which poliomyelitis is one—and to bronchitis, cancer of the lung and disease of the coronary arteries of the heart, now among the conditions which are more prevalent and dangerous than the old infections like tuberculosis, diphtheria, scarlet fever, typhoid and cholera. The increasing number of old people in the community is bringing with it new medical and social problems. The prevention of accidents in the home and of dysentery and food poisoning, all of which are at far too high a level, demand vigorous action. Atmospheric pollution, noise, radioactivity, and the tension and speed of modern life are of considerable public health importance.

4. ENVIRONMENTAL HYGIENE

The word "environment" means "the surroundings" or "the neighbourhood", but it is now used in a more special sense. All living things are influenced to an enormous extent by their surroundings; and the large number of circumstances which may have effects—for good or evil—on the organism, are grouped together as **the environment.** Among the outside influences which may affect life, growth, health habits and so on, are climate, shelter and food supplies, and also work and leisure. During the long process

of evolution, the different forms of life have adapted themselves to the changing conditions around them; in other words, they have learned to live in harmony with their environment. Those unable to do so have perished. Man, the highest form of animal life, has adapted himself well. He can live in the Tropics or the Arctic, in valleys or on mountains, provided he is properly fed and clothed and has had time to become acclimatised. On the other hand, very adverse conditions have sometimes proved too much for him.

A community which is badly housed and fed, and which has a low standard of hygiene and sanitation, will inevitably suffer from ill-health and disease. History has many examples of outbreaks of infectious disease which have spread across the world in epidemic form, killing great numbers of men and domestic animals. (It is significant that the word "epidemic" comes from two Greek words meaning "upon the people".)

There has always been considerable movement of mankind from place to place, it continued even after man became a social being—a community dweller rather than a nomad. This human drift, sometimes depopulating whole countries, has taken place because climatic conditions were adverse, crops poor and game scarce. Political and religious persecutions have also made it necessary; and so has the overpopulation which follows ample food supplies and prosperity. Migration has been an aftermath of epidemic disease, which has forced the survivors to seek a healthier environment: the Pontine Marshes were forsaken by the Romans for this reason.

It will be gathered that the shielding of people as much as possible from environmental hazards has become to an increasing degree a communal responsibility; that is why this branch of hygiene is often referred to as **communal hygiene.** Reference has already been made to the obligations which individuals have to themselves and to their families and fellow citizens. This aspect of health promotion is known as **personal hygiene.**

5. PERSONAL HYGIENE

People living under similar circumstances often adopt very different attitudes towards their health and that of their families, in other words, their **health consciousness** is not the same. In one household, cleanliness, good food and sound habits are a routine;

the house next door can be dirty and disorganised, its occupants below average physically and mentally. The first family uses the medical and social services wisely; the second disregards them or uses them wrongly. Everyone has a moral obligation to try and keep his infection to himself—to take precautions against passing it on to others. "Coughs and sneezes spread diseases" is a well-publicised health slogan which is too often ignored. The common cold, influenza, and tuberculosis of the lungs are among the affections which can be spread by uncontrolled coughing and spitting. The germs of food poisoning and of other bowel infections can obviously be carried to food by unwashed hands or septic cuts on the fingers (often covered with a foul bandage) and when there is a low standard of hygiene in the kitchen. Lice and the mites that cause scabies pass to other human hosts in close proximity to infested individuals; overcrowding and low standards of cleanliness favour the passage.

Good health habits cannot be formed too early in life. Parents and others who have children and young people under their care thus have heavy teaching responsibilities. Children are imitators: they copy the acts of their elders, the bad as well as the good ones. The simple principles of cleanliness of the body, hands, hair and teeth should gradually become automatic. Accidents in the home are a particular hazard to children and to old people. Prevention has a very personal aspect—parents need to teach the young the dangers of fires and naked lights, and of eating tablets or drinking liquids they find lying about; parents should beware of inflammable clothing material, fires unprotected with fireguards, and medicines and disinfectants left lying about within easy reach of the young.

CHAPTER II

HEALTH KNOWLEDGE

HISTORICAL

Ignorance has always proved a big obstacle to health progress. The hygienic standards of the Greeks and Romans, which were almost a religion, were swept away in the Dark Ages which began in the 5th century when classical learning was thrown aside. When it was believed that ill-health was due to the wrath of the Gods, witchcraft or the work of demons, there was little hope for common-sense prevention. Superstition goes hand in hand with ignorance; that is why the witchdoctor and the tribal "medicine man", held so much power. The standard of medical knowledge in Europe and Britain was low, and treatment of illness was generally ineffective. Under such conditions, charms and amulets and the advice of the astrologer could not fail to be more popular than the pill or potion of the doctor.

The close of the Middle Ages witnessed a revival of learning which the discovery of printing helped to spread to the people. More prosperity and some betterment of social conditions followed, yet the majority remained uneducated and poor. Medical knowledge was slow in improving, and the **causes** of illness were still imperfectly understood. Under these circumstances any great reduction in the amount of national sickness and disablement, and in the death-rates from preventable diseases was not to be expected. It is true that after 1665 there were no more epidemics of plague in this country. Since the Black Death in the 13th century this disease had been the great killer of the age, but it vanished without anyone knowing for certain what had brought it. Leprosy went the same way. But other infections persisted with increased intensity and new ones appeared. Syphilis became widespread at the end of the 15th century, and the sweating sickness (influenza) was introduced from Europe. Malaria was then an important infection in England; tuberculosis increased; there were successive outbreaks of smallpox; and dysentery, typhus, typhoid and cholera caused countless deaths.

THE GERM THEORY

From the earliest times it had been guessed that some diseases were contagious (communicated by contact). There are many references in the Bible to isolation of the infectious and the cleansing of the person, clothing and the house (Leviticus). In A.D. 620 a special hospital for lepers was opened in Nottingham. Quarantine and fumigation were practised in many European cities some hundreds of years ago. It was not, however, until the middle of the 19th century that the discovery of bacteria gave absolute proof of the need for such measures. Even then it took a long time for the "germ theory" to be universally accepted: Florence Nightingale was among those who never believed in it. The fact that bacteria and other minute organisms are the specific causes of certain diseases is now unquestioned, but it was not enough to find these organisms, it was necessary, in addition, to learn how they found their way from the sick to the healthy, and why some people were able to resist them more easily than others. Painstaking research has given the answer to many of these secrets. Among the many carriers are food, air, water; animals, insects (called *vectors* from the Latin "to carry"), and contaminated articles. Some diseases can be propagated by one vector only, as happens in malaria (the mosquito) or typhus (the louse), others may spread through more than one carrier.

ARTIFICIAL IMMUNITY

With the discovery of bacteria came the hope that man could be protected against their inroads by artificial means. Jenner had shown the way in 1796 by using the virus of cow-pox; 90 years afterwards, Louis Pasteur, who had successfully inoculated against fowl cholera and anthrax in cattle, injected a child bitten by an animal suffering from rabies. The child did not contract this dread disease. Pasteur had proved that the strength of the virus could be lessened by drying, whilst retaining its power to give protection. Since then immunisation has become available against typhoid, diphtheria, tetanus and whooping cough, and more recently tuberculosis (B.C.G.), poliomyelitis and influenza, as well as against some diseases prevalent in other countries. The artificial immunity which follows lasts for varying periods, and reinforcing injections are needed from time to time. These new weapons have

their maximum effect when the old established principles of hygiene are observed at the same time. They are not alternatives to personal responsibility, but, instead, act in close partnership with it.

FOOD AND NUTRITION

The scientist and the doctor must walk hand in hand. There was no possibility of actually seeing the bacteria, whose existence had long been suspected, until the invention of the microscope; the viruses, which are even smaller, had to await the electron microscope before they could be viewed. Physics and chemistry laboratories have given the world X-rays and radium, new drugs to prevent and cure disease, insecticides, and important facts about atmospheric pollution, heating, lighting and ventilation. The composition of the foodstuffs and the manner of their breakdown and mode of action in the human laboratory have been revealed by chemists and physiologists: the analyst's advice is constantly being sought by the Medical Officer of Health on the purity of food offered for sale in the shops.

Without sufficient food, and without food containing what the body needs for growth, repair and energy, health will soon suffer. Under-nourishment in the young affects mental as well as physical development. Famine, like pestilence with which it has so often been associated has had a big influence on history. A nation with a high rate of sickness may lack the man-power to produce enough food, and this in its turn causes more ill-health. Quality is no less important than quantity, and a lack of essential elements in our diet or the presence of abnormal ones has bad effects on the working of our bodies which may lead to serious illness, or even death. When the needs of the body in proteins, carbohydrates, fats and mineral salts became known, and the energy requirements (calories) at different ages and for manual or sedentary occupations under different climatic conditions were worked out, it was possible to plan the correct diets.

THE VITAMINS

Illnesses like scurvy, rickets or beri-beri have been widespread in the world for centuries. They are not due to insufficient food, but to the absence of some essential constituents called accessory food factors or **VITAMINS.** These were not discovered until the

present century, and although they need only be present in very small amounts, if they are lacking the body functions are impaired and illness, or even death may follow. A normal diet containing fresh foods supplies all that is required, but improper cooking or too-long storage may reduce the vitamins content.

Scurvy, a scourge of sea-faring men, was successfully overcome by taking fresh vegetables or lemon juice, long before a lack of vitamin C was known to be the cause. In 1630 a regular issue of lemon juice prevented scurvy on a long voyage, and Captain Cook kept his crews healthy by this means. It is surprising that 150 years were to elapse before it was issued to all Navy personnel.

Rickets, characterized by deformities of bones, is another condition resulting from the absence of a vitamin (vitamin D), which influences the absorption of calcium, an essential element in bone formation. This disease was a prime cause of weakness in the children of the 19th century. The ones chiefly affected lived in industrial slums, were fed wrongly, and had too little sunlight. The poor state of agriculture contributed to such diseases. When 40 years ago vitamin D was discovered the way to prevention was clearly shown, and the condition is now rare in this country. Health knowledge, improved social conditions, the availability of food in plenty, and supplies of cod liver oil, have gained the day.

For some years vitamin preparations have been available at clinics and other places, and millions of children have taken them. This has made a valuable contribution to the improvement in the national health. It must be emphasized again however that people in this country—especially adults—who have a normal diet get all the vitamins they require. Nevertheless, the full story of the vitamins has not yet been told, neither have all the facts about diet and nutrition been discovered. Food habits are not easy to change. People usually eat what they like—if it is to be had—and this is not necessarily the best for them. Over-eating has its dangers as well: too many sweet foods are bad for children, and an excess of animal fats is now being looked on as a contributory factor in heart troubles of the middle-aged.

OTHER ILLNESSES

The infectious and nutritional diseases now account for far less illness than formerly, and more and more attention is being

directed to the prevention of other complaints about which less is known. The illnesses which nowadays cause most of the ill-health and death are bronchitis, rheumatism, cancer, ulcers of the stomach and duodenum and heart disease (coronary thrombosis). Intensive investigation during the past few years is already throwing new light on these conditions as well as on mental illness, which is a major cause of disablement. The indications are that there will be much progress in the near future.

The prevention of blindness and birth deformities, and the early detection of deafness and other physical handicaps, to which greater attention is being paid, are yielding rich dividends. The mentally and physically handicapped were grossly neglected in former days, but now a high proportion are enabled to lead a normal life and become useful citizens. Rehabilitation—which means "restoration to former capacity"—is today a routine adjunct to treatment.

CHAPTER III

HEALTH AND DISEASE

WHAT IS HEALTH?

There is no sharp line between good health and bad health. The human body is a piece of highly complicated machinery, and, like all such machines, it must work as a whole. In health all of its many parts (organs) are in a sound condition, able to carry out their own particular functions smoothly and competently, but, in addition, they have to work in concert with each other.

The healthy human machine is able to make the best use of the fuel which it is given. In other words, it can break down the substances which are taken in as food and drink into the special chemicals of many different sorts which it must have for growth, development, the production of energy and the repair of tissue wastage. It must be able to get rid quickly of waste products and heat.

Further, it has to be in a position to cope with constantly occurring stresses and strains and the changes in environment which are always going on. The healthier the body and the more co-ordinated its several parts the better it can react to these influences.

It is not easy to give a short definition of health. The word comes from the Anglo-Saxon *hál* meaning whole, sound, safe: this gets fairly near the mark. The reader will now agree that the popular conception of health as signifying absence of disease is far too narrow, for, as has been explained, not to be ill is not necessarily to be in the full vigour of health in mind and body—the one being closely bound up with the other. It is a joy to *feel* well; to be happy and contented ("on top of the world", "full of beans"), with drive and energy, and the ability to contend with difficult situations—in fact, to play a full part in life as a person and a citizen. This is health. It is a rich reward for the care devoted to its attainment and preservation. Money cannot buy it.

Unfortunately far too few people in the world are blessed with perfect health. Apart from actual disease, there is a great deal of

what may be called sub-health often associated, especially abroad, with malnutrition, poverty and insect-borne disease. Two-thirds of the world's population of 3,000 million, are said to be undernourished. Even in countries with the least amount of sickness, temporary departures from health are experienced by most people (the common cold, influenza and food poisoning for example) and more serious illnesses are still too frequent. But rapid progress in diagnosis and treatment has accelerated recovery, and vaccines have become a new preventive force. In recent years rehabilitation has become firmly established as a necessary accompaniment of treatment: it has completely altered the outlook in many of the so-called chronic diseases.

THE SICK AND INFIRM

Every community has—and always has had—its share of sick and infirm people. In the past these unfortunates have too often been classed as useless; either pitied or ridiculed, and generally neglected. Yet—and history has many examples—no few have overcome severe disabilities and have achieved eminence in many walks of life. In our own times there has been a notable change of attitude to those with physical and mental handicaps. The result is that far more of these people can now live happy and productive lives than ever before. Many can take their places with confidence in the routines of everyday life. There has been medical as well as social progress, which has enabled the handicapped to receive physical help not previously obtainable; this in its turn acts as a stimulus to people to overcome their handicaps. Today large numbers of those who previously would have been placed in the ranks of the unemployable, are doing useful work and are self-supporting. Health is, after all, a relative term. Those who have succeeded in coming to terms with "permanent" disability are very often "healthier" than many of their fellows with no obvious physical handicaps.

THE CAUSES OF DEPARTURES FROM HEALTH

No two people are alike. Physical, mental and emotional characters are partly inherited (genetic) and partly acquired (environmental). The occurrence of disease may be due to either of these influences, or they may act in combination. Few diseases or

deformities are actually transmitted from parent to child (tuberculosis was believed to be carried in this way, but it has long been known to be the result of contact with an infectious parent after birth). In many diseases resistance to infection, for longer or shorter periods, is handed down from mother to child. The whole question of heredity and health is complex, and it cannot be discussed at length here, but it will undoubtedly play a more important part in the personal hygiene of the future. The connection between environment—using the word in its widest sense—and health has already been looked at; it is to be noted that it includes the environment of the expectant mother as influencing the health of the child not yet born.

It may be useful to tabulate the major causes of a departure from health. The list serves as a general guide only; more than one factor may operate. The causes are not necessarily set out in order of importance.

A. **Inherited.** (Genetic).

B. **Acquired.**

(i) Ignorance. Bad habits. Disregard of health rules.
(ii) Low standards of living. Unsuitable housing, clothing.
(iii) Adverse climatic conditions. Exposure. Atmospheric pollution.
(iv) Exposure to infection. Presence of vectors. Lowered resistance.
(v) Infected food or drink.
(vi) Insufficient or improper food or drink. Poisons. Alcohol. Tobacco.
(vii) Occupational hazards.
(viii) Accidents.
(ix) Stresses and strains, emotion, anxiety, etc. Fatigue. Excesses.
(x) Ionising radiations (X-rays, Gamma rays, etc.).

C. **Other.**

(xi) Degenerative changes. Ageing.
(xii) New growths and other conditions of uncertain origin.
(xiii) Congenital (i.e. after conception), e.g. congenital syphilis; deformities following german measles in the mother, etc.

It must be understood clearly that although specific diseases such as diphtheria and tuberculosis cannot occur unless the germs concerned are present in the body, their presence is not necessarily followed by an attack of the disease. Personal resistance and environmental and psychological factors play their part in making the human *soil* fertile or barren to the *seed* of infection.

CHAPTER IV

SOCIAL ASPECTS OF ILLNESS

There is almost always a social as well as a strictly medical side to illness. Specific treatment of the complaint is the immediate step, but with it goes an assessment of the sick person's background, with a view to the elimination of any factors which may delay recovery. These are sometimes complicated and difficult to bring to the surface. The doctor, because he treats the patient as an individual and not only as a case, takes great pains to discover them. He can call on many people to assist him—the hospital almoner, sister and chaplain, the health visitor of the local authority, and many others.

PREVENTABLE DISEASES

As has been shown, one person with a communicable complaint can spread it rapidly in the home, factory, school or barracks. Rapid detection enables control measures to be set in motion. The **notification** of these diseases to the medical officer of health is a first move. The source of infection is investigated, isolation is arranged, contacts are examined and, perhaps, placed in quarantine or kept under surveillance (they may be protected with drugs, serum or vaccines). Advice is given about disinfection of discharges and clothing: rooms may be fumigated, but this is not often necessary nowadays, ventilation, thorough cleaning, with a lavish use of soap and water, are all that is necessary except in the major infectious diseases like smallpox. Appropriate action is taken when there are animal, insect or other vectors implicated.

Preventable diseases use up valuable hospital beds, and take up the time of doctors and nurses. The beds in military hospitals in time of war have always been full of this type of case, which far outnumbers battle casualties and is the main cause of man-power loss.

COST

The cost of ill-health to the country is enormous; not alone because treatment with modern drugs and the occupying of a

hospital bed are so expensive (curtailing the funds available for prevention and research) but on account of the absence from work which it causes, which in turn restricts production and affects national economy and prosperity.

INDIRECT EFFECTS

But these considerations apart, the effects of illness are seldom confined to the patient; there are repercussions in the whole household, more particularly if the illness is of long duration or the mother is taken to hospital. When the bread-winner is unable to work and the income falls the whole family suffers. But health insurance and sick-pay schemes have reduced these hazards a good deal; nevertheless, finance is too often a source of worry, notably when there are debts or hire-purchase instalments to be paid. If the mother is incapacitated and there is no other help in the home, the children run the risk of being neglected. Anxieties about these financial and domestic matters can be very real, and unless they are dispelled recovery is delayed.

MEETING THE DIFFICULTIES

Fortunately these difficulties can usually be met. Financial troubles can be eased by advice and reference to the appropriate quarters. The home help service, boarding-out schemes, and day nurseries can be utilised when the mother is sick at home, in hospital or on convalescence. Home nurses, almoners, health visitors and children's officers assist the doctor in these matters, and so, of course, do relatives, neighbours and voluntary workers.

Meals for the sick and housebound are provided in many places by the "meals on wheels" and other services. Home helps include in their duties, shopping, cooking and light washing. These services are expanding.

HOME CONDITIONS

Since unsuitable living or working conditions often cause or contribute to illness or accidents, their investigation and correction is of the first importance. A house is not healthy if it is damp, in a poor state of repair, overcrowded or without proper washing, cooking and food-storage amenities. These conditions are often accentuated when the occupants are not hygiene-conscious—but it

is not easy to live hygienically in insanitary surroundings. Home accidents—which outnumber those on the road—are due to carelessness and disorderliness as much as anything, but structural defects contribute to them. In the young and the old they may have dire consequences, but the trivial accidents, which often precede the serious ones, are danger signals which call for urgent preventive action.

HANDICAPPED AND DISABLED MEMBERS OF THE FAMILY

When one of the family becomes seriously ill or disabled some domestic upheaval is bound to follow, but in most cases this soon rights itself. When the disability is likely to be of long standing or permanent the position is not so easy. The new problems and difficulties which are inevitable take longer to overcome; how long, depends, when the first shock is over, on the way the new situation is approached and its consequences faced. Most families soon adjust themselves, and they find it easier to do so if they take advantage of the advice and assistance which is available to them. The afflicted person is then given the best chance of living with his disability, and of making a contribution to family life. In the words of Bacon: "adversity doth best discover virtue".

Practical help can be given to the doctor and the nurse in many ways, such as the giving of insulin to diabetics and the carrying out of tests for sugar, the supervising of exercises for the child with asthma, and the preparation of special diets.

It is sometimes desirable to change upstairs accommodation for that on the ground floor, to adapt furniture and fittings and to install special appliances and provide "gadgets".

The tuberculous family (fortunately, not met with so often nowadays) has its own special problems. The patient, and if necessary the contacts, may receive extra nourishment (butter, milk, eggs), and a separate bed and bedding are obtainable on loan: light occupation is arranged at home or at a handicrafts' class. Most important of all, advice and help are given to prevent the spread of the infection.

CHAPTER V

PERSONAL CLEANLINESS, CLOTHING AND FOOTWEAR, POSTURE

A CLEAN BODY

Without body cleanliness there cannot be good health. The skin is the chief regulator of the temperature of the body; from it heat is lost by radiation and conduction, and by sweating. When the sweat evaporates it requires extra heat (**latent heat**) to do so, which it takes from the body, cooling it in the process. (One kilogramme of water at 100°C. requires 537 heat units to turn it to steam at 100°C.) The glands also secrete fatty substances which lubricate and moisten. The skin is always shedding fine particles which, together with the other secretions and outside dirt, adhere to it and to the clothes. The skin and the clothing which covers it must, therefore, be cleaned regularly; if not, the pores become clogged, the mechanism for losing heat is impaired, and infection giving rise to skin eruptions may follow. There are also added risks of infestation with lice, fleas and itch-mites. The accumulation of dirt and secretions gives rise to unpleasant body odours.

Soap (which contains alkalies and fatty acids) and hot water are necessary to emulsify the fatty deposits which hold the dirt to the skin and clothes. Coarse soaps containing an excess of alkali irritate the skin by removing too much fat from the surface. For babies and people with sensitive skins, soaps with an excess of fat and no free alkali are desirable. Hot baths—which should preferably be taken at night—relax the muscles and soothe and calm the mind and body: the cold plunge or shower stimulate and invigorate, so does brisk rubbing with a loofah or rough towel.

The feet, armpits and crutch, which receive a large share of perspiration, need daily washing. Careful drying between the toes after removal of scales of skin is necessary. Other preventive measures against fungus invasion are discussed on page 55.

CLOTHING

There is no need to stress the need for frequent changes of underclothing, particularly when occupation, exercise or climate

promote excessive sweating. The new detergent washing powders allow dirt and grease to be removed far more effectively than formerly; care should be taken, however, to rinse the hands and the clothes thoroughly otherwise skin irritation may occur.

The earliest men probably wrapped themselves in animal skins to keep out the cold and to protect themselves from injury. Clothing has been worn for the same reasons (influenced, of course, by the dictates of fashion) ever since. There is evidence that Neolithic man wove a rough cloth of flax, and centuries later, the Egyptians used wool. Now, clothing is made from wool, silk, cotton and linen, with the more recent additions of the synthetic materials such as rayon and nylon.

Since the type of clothing is a factor in either keeping the body warm or keeping it cool, it must be chosen carefully for different conditions. To prevent excessive heat-loss underclothing should not conduct heat away rapidly. Air is a **bad conductor,** and furs or wool are warm largely because there are air-spaces between the fibres. A wide-mesh string vest keeps the body warm by forming a cushion of air around the body. Silk, linen and cotton are three or four times better conductors than wool, and are not as satisfactory for undergarments unless suitably woven. Another important property of clothing material is its **porosity**. Wool absorbs well, silk, cotton and linen to a lesser extent in that order. Artificial silk absorbs moisture better than linen or cotton; it is also a bad conductor. Garments that do not absorb perspiration tend to cling to the skin and conduct heat away from the body. The extent to which air can pass through a material determines its **permeability** or its power to ventilate the body. Like conductivity it depends a good deal on the weave. In cold climates closely woven outside garments keep out the wind and the cold air; in hot weather an open weave is preferable and clothes should be loose as well as light in weight and colour. Clothing that constricts is harmful.

Unlike cotton, silk and artificially produced cloths, flannel, which is made from wool, can be too irritant for sensitive skins. For this reason wool is frequently mixed with cotton or other material in the manufacture of winter underclothes. Damp clothes cool the body because water conducts heat better than air.

Inflammable clothing has caused a large number of deaths. Night attire of "flannelette"—made from cotton—is particularly

dangerous, and so are childrens' dresses made from other inflammable material. It is the duty of members of the public to ensure that before purchasing materials of this type they have been treated so as to render them non-inflammable. They can also safeguard themselves and their families, especially the very young and the aged, by making certain that all fires are properly protected by fireguards.

The **colour** of a material has some influence on its warmth: if it is dark it absorbs heat, if light, heat is reflected away from the body. Clothing fibres should be **supple,** so that body movement is not restricted. **Elasticity** is another property of wool fibres, that is a reason why woollen socks are more suitable than those made of cotton. In the past far too much clothing was worn in this country, especially by women and children. Layer upon layer of tight-fitting garments impaired ventilation and prevented free movement of the muscles of respiration.

FOOTWEAR

Too little regard is paid to the choice of **footwear.** Nature did not intend the human foot to be tightly encased, and it rebels against such treatment. If children could be allowed to grow up with bare feet, the next generation would be relieved of most of the foot deformities now almost universal in civilised countries. Unfortunately the modern way of living is hardly compatible with walking barefoot, so the exercise of great care in the selection of the covering for the feet is the alternative. This demands the most careful fitting, with frequent inspection of the growing feet of children. Every effort should be made, on medical advice, to correct deformities early. Bunions, hammer toes and ingrowing toenails are common sequels of wearing wrongly shaped and too tight or too short boots and shoes. Footwear for walking is often too heavy and the uppers are not pliable enough. The foot broadens and lengthens when it supports the weight of the body—a point to be remembered in fitting.

The sharing of boots and shoes is to be deprecated; apart from the physical objections it predisposes to the transference of fungus infections. Waterproof material prevents proper ventilation and evaporation of moisture, that is why the insides of rubberised boots become wet from condensation. It is wise to wear them for short

periods only, and afterwards to dry them thoroughly—but this is not an easy matter.

EXERCISE AND POSTURE

Natural exercise is a component of healthy living. It stimulates the organs of the body, develops muscular power, improves the appetite, promotes excretion of waste products, corrects bad posture and produces a general feeling of well-being. It acts as a foil to the daily routine in the factory or the office, providing mental and physical change and relaxation. Those who spend much of their time at desks or in motor cars need it most. People out of condition should guard against too strenuous exercise at first—above all, in middle-age, when the wrong sort of exercise is damaging. Walking, dancing and swimming encourage natural movements. Proper relaxation is as important as exercise.

Gymnastics (from the Greek word meaning "without clothes"—those who exercised were naked) in an organised form, originated in Ancient Greece, providing the background of child education and the promotion of health. The Gymnasia eventually became centres for higher physical and mental education. The exercises most favoured were running, wrestling, jumping, swimming, with javelin and discus throwing. The cult spread to other European countries, but was gradually abandoned. In Britain "disciplinary" exercise was revived about the mid-nineteenth century, its popularity having spread from Germany and Scandinavia, and it found a regular and effective place in military training. It was eventually established as a part of boys' education, with consequent betterment of physique. With or without apparatus, gymnastics is followed in the healthy subject by muscular development; exercises should be designed, however, to produce general improvement in muscle tone rather than over-development of certain groups of muscles. "Physical jerks", if compulsory and inexpertly directed, are unpalatable to many and in some cases may be harmful. Group exercising of young folk is a matter for careful selection and expert supervision. No child must be expected to undertake feats beyond his capabilities. Exercise not enjoyed is least profitable (*figs.* 4 & 5).

Physical education—which has replaced **physical training**—is a more acceptable discipline; it more correctly describes the

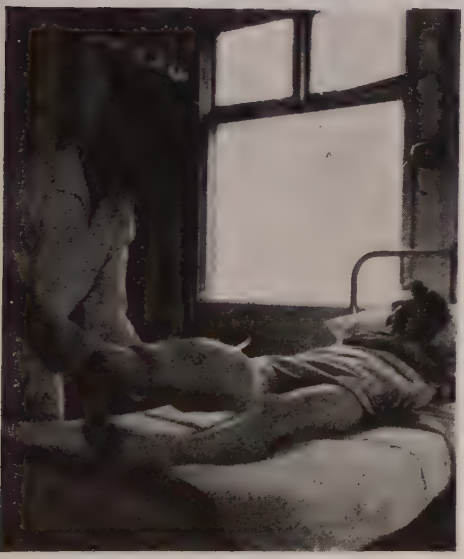


FIG. 1. (*Above left*)
APPARATUS IN
HOSPITAL

FIG. 2. (*Top right*)
GROUP THERAPY

FIG. 3. (*left*)
REMEDIAL TREATMENT
AT AN EARLY STAGE

wider scope of these activities, which are now based on sounder medical and educational principles. Play, enjoyed by all young animals, is a part of the normal process of growing-up. The child at play is relaxed, assuming natural postures, at the same time learning to co-ordinate muscle movements. Team games teach

young people to strive for an objective, to learn initiative and self-reliance, to be unselfish and to keep the temper under control.

OCCUPATIONAL THERAPY AND REMEDIAL EXERCISES

The restoration of function after illness or injury is hastened by occupation and exercise. During the last war there were great advances in these methods of rehabilitation, of which full advantage was taken after the war. Today suitable occupation, mechanical aids, and graduated exercises are an accepted part of treatment of patients suffering from mental as well as physical disabilities. They accelerate cure and help the disabled to regain lost functions or to compensate for a disability (*figs.* 1, 2 & 3).

POSTURE

Before the bony structures of the body are fully developed, deformities readily occur if wrong attitudes (postures) are adopted at school or at work. Correct posture, which involves the co-ordinated action of many muscles, must be learned early; the value of play and exercise in this connection has already been stressed. A bad posture becomes a habit which is progressively hard to alter, but people of all ages, including the elderly, can benefit from advice on how to sit and relax properly. It is important in young people to prevent the occurrence of deformities such as round shoulders, curved spines and flat chests.

Observation of a group of people will demonstrate how many stand, sit, or walk incorrectly: there are right and wrong ways of sitting at a desk, driving a car, digging the garden or lifting articles

FIG 4.

FIG. 5.

from the floor. Correct posture is closely bound up with the ability to relax the muscles and the brain. People can learn how to relieve tension and to offset fatigue, with great advantage to themselves. These matters are well set out in a booklet published by the British Medical Association*, which the reader who requires more information on this interesting subject is advised to consult.

*See under "Further Reading", Page 148.

CHAPTER VI

THE WELFARE OF OLD PEOPLE

Great attention is now being paid to the welfare of older persons. This has become necessary because of the increase in the population over 65, not only in actual numbers, but also in proportion to the total population. Very many live alone and are unable to obtain the help and attention they need. This change in the age-picture of the population has been taking place slowly but steadily for a good many years but it is only since the end of the war that its full significance has come to be realised. In the 1890's young people formed the bulk of the population, persons over 65 numbered little more than four per cent. Now, chiefly because people are living longer, and families are smaller, the percentage of the population over 65 has risen to 11. It is likely to rise even more in the future.

Of the million-and-a-half people in this country who live alone, a million are more than 60 years old and of the two-person households, four out of every ten contain people of pensionable age—many of them sick and infirm. It is the members of these two groups who constitute the main problem.

CONTRIBUTORY FACTORS

There are other factors which have a bearing. The smaller family means that there are fewer grown-up children to take their turn in looking after the ageing parents. (There has been a marked increase in the number of women who go out to work.) Since the war the housing problem has increased the difficulties of accommodating parents in the homes of their children or in suitable accommodation elsewhere. On the other hand, it must be remembered that a very large proportion of people over 65 are fit and well, quite capable of looking after themselves; they neither need, nor indeed welcome help from others. In showing concern at the new medico-social problem that has suddenly appeared, it is a mistake to look upon all people of 65 or over as a distinct section of the population and to place them in a separate compartment for purposes of health and

FIG. 6.

welfare. Nevertheless, those who live alone run greater risks of illness and accidents. Adequate meals, home comforts, and early attention when illness occurs are of great importance. Two-thirds of all hospital beds are occupied by those over 65 or by the single, widowed, or divorced. (The bulk of the population of mental and chronic hospitals is single.) There is clearly need for a concentration of preventive action on members of the population who fall into these categories and it demands a well co-ordinated joint effort in which members of the public, social workers, and doctors all play a part. Adverse habits and characteristics seldom begin suddenly at the age of 60 or 65. Loneliness, immobility, malnutrition, and neglect accentuate them and bring about early mental and physical deterioration in many people. The person who is house-

FIG. 7.

bound for what should only be a short period may quickly become bed-ridden for want of attention. Simple chiropody often has beneficial results. The early recognition and treatment of defects of the eyes, ears and teeth is of first importance. Surveys have shown how high is the incidence of minor disabilities and how serious may be the sequel if they are allowed to progress. Many of those who are not seen until they are almost blind would have received great benefit had they been treated earlier. Anxiety and depression following an isolated existence, comparable sometimes to that which occurs in solitary confinement, is not rare.

HOW OLD PEOPLE CAN BE ASSISTED

The principles to be adopted to assist older people to preserve their health and well-being are now better understood, but it is not always so easy to put them into practice. The large number of organisations, voluntary and statutory, that are now engaged in the task of helping them must work together as a united force towards a common goal. Many old people are "difficult", but as Cicero said, peevishness and irritability are faults of character not of age, and they are excusable to some extent in those who fancy that they are being neglected, despised and ridiculed. Whatever organised bodies may be doing—and it is gratifying to see the increasing

FIG. 8.

interest they are taking—it is the public themselves, the relatives, friends, neighbours, and fellow citizens—young and middle-aged—who can accomplish most. They are in the best position to counteract the mental and physical hazards which result from a feeling of being "neglected, despised, and ridiculed". When they themselves pass into old age they will thereby be better prepared to meet it, and live with it with satisfaction, than many of the present generation of pensioners who have not learned to do so.

PRACTICAL AID

Practical aid can now be given to those whose working days are over (especially those who live alone)—help that was almost non-existent ten years ago, when the word "geriatrics"* first came into use. The principle that the majority of old folk are best off at home has been firmly established and great efforts have been made to make the home more suitable. Old peoples' welfare committees, the meals on wheels service, that splendid innovation the old people's club, and employment schemes for the elderly are supplying long-felt needs (*figs.* 6, 7, & 8). More is being done to prevent accidents in the home which take a heavy toll of the aged; here again health education and the co-operation of everybody, as well as the elimination of physical causes (the unprotected fire, defective gas appliance, dark staircase or worn floor) are important.

Cicero's words are worth remembering: "Old age is wretched if it has to defend itself with an apology, and its worst feature is that it makes those at that season of life feel that they are troublesome to others".

**Geriatrics* (the medical care of old people) is derived from Greek words meaning "old age" and "physician".

CHAPTER VII

HEALTH EDUCATION

HEALTH HABITS

Basic health habits should become second nature. They are far more likely to be acquired and followed when there is full understanding of the need for them. A knowledge of the broad facts about the structure of the human body and its working machinery —and everyone should know something about it—is the foundation upon which health instruction should be built. First-aid training gives a splendid background. During the last century when sanitary reform came into being, it was the lack of education and the apathy which went with it that were the greatest obstacles to better health. This lack of interest—there was often open opposition—was widespread; not unexpectedly, it was greatest in that section of the populace which, living under the worst possible conditions, suffered most for want of it. The health of a nation is the history of that nation: better education precedes social reform, which in turn raises the standard of health and brings prosperity.

The main principle underlying the activities of those whose concern is the public health, is health education. They have a duty to keep the public informed, and to engage in health propaganda, but as will be seen, their task does not end there.

The public health service is designed for this purpose, but it is by no means the only service that should engage in this work. All members of the health and social services participate, and so do the churches and the schools, youth organisations and community centres. The national and local press can be great allies. To an ever increasing extent the radio and television, with their nation-wide audiences are influencing public opinion on matters of health and sickness, but not always correctly. The health magazine, "Family Doctor" and its booklets, and the journal "Better Health", are excellent publications which give the public expert information and an insight into current medical progress and practice.

THE LOCAL AUTHORITY

The close contact which the members of the staff of the local authority have with the public gives them many opportunities for health teaching and propaganda. It provides the public with a ready source of information and guidance. The doctors, health visitors, health inspectors, district nurses and home helps of the health department are well qualified to perform this service, and so are the welfare, children's and housing officers, and other social workers. A feature of their work is the practical assistance they can give, and the fact that they work as a team. The activities of the health visitor must be described in a little more detail.

THE HEALTH VISITOR

The original health visitors—unlike the highly trained persons of today—were working-class women, first appointed by a voluntary society in Manchester in 1862 to visit poor families and teach them the simple rules of health. At that time the number of deaths among children in any one year was frightful, ignorance of the need for cleanliness and of the feeding and general care of babies were among the major reasons. So successful was the work of these visitors that after a time they were engaged by the local authority. Other authorities gradually followed suit. In due course most of the untrained women were replaced by state registered nurses, and eventually midwifery training and the possession of a special health visitor's certificate were required. It will be seen that the health visitors of today are highly trained and competent persons, occupying key positions in the health field. Until 1948 they were mainly interested in the welfare of mothers and babies at home and at the welfare centres, as well as in the health of school children: it is in no small degree due to their efforts that there has been a marked and progressive improvement in this direction. The duties of the health visitor now cover the whole family, including old people. The prevention of mental ill-health is high on the list of their activities, and the family with problems is one of their main concerns. They now work more closely with family doctors, as members of their domiciliary teams, as well as with hospital almoners, children's officers and other social workers. These, and some of the other links, are shown in the diagrams in the Appendix. This co-ordination is of great value in helping to knit together the separate parts

of the health and social services. In some rural areas, the health visitor works also as the district nurse and midwife.

EDUCATION OF THE YOUNG

At no age is health teaching more rewarding and necessary than in childhood and youth. It is then that the disciplines of life must be learned together with an understanding of personal responsibility, and the need for care of the body and the maintenance of physical fitness. To learn to spend leisure time wisely is important. The home, with its love and security, is the place where these foundations are laid. Child neglect with its serious consequences is often due to the parent's lack of knowledge, and over-indulgence, for the same reason, may have no less unfortunate repercussions in later life. Some of the ways in which parents can obtain guidance in these matters have been discussed already.

Those who instruct the young at school or elsewhere should not forget that perhaps the most useful health lessons, particularly for younger children, are those taught indirectly during instruction in other subjects. Geography and history lessons and religious instruction provide many opportunities; chemistry, physics, biology and domestic science just as many. Games and physical training—now more appropriately called physical education—are specific aspects of health education. Whilst the set lecture on a health topic has its place it is as well to remember that fit young people, and grown-ups for that matter, are not very interested in health for health's sake. Those who are blessed with it are indifferent to the possibility of a departure from it. They are interested in the improvement of physique and personal appearance, as exemplified by famous personalities in sport, films, the Services and other walks of life—the heroes of yesterday and today. This should be a guide to the health teacher. Camping is another healthy activity, which, among other things, directs attention to sanitation and food hygiene. Lastly, young people who have learned good health habits elsewhere do not forget them at home, where they may be copied by the other members of the family.

HEALTH EDUCATIONAL METHODS

The old-fashioned lecture of an hour's duration is not very acceptable to people of any age, unless the audience is of a special character and the lecturer outstanding. To keep the attention of his

listeners and to impress his message so that it is remembered the health educator of today has to rely on more than the spoken word. There are two methods: a short talk followed by group discussion, and the use of diagrams, slides and films. In the former the meeting is broken-up into small groups, each of which elects a leader; after consultation together the leaders give the views of their groups, from the platform. Rôle-playing may be used to depict a problem.

There has been rapid improvement in the technique of what are now known collectively as "visual aids". These consist of models, and exhibits in great variety; puppet shows and playlets; films and film strips; posters and pamphlets; flannel-graphs and other models of this type.

Films, especially colour cartoons, have a great appeal to young people. Unfortunately they usually lack local interest. They should not be used alone.

Film-strips with written commentary or tape-recordings, on a great variety of subjects, are now easily obtainable.

Posters need to be used with care. They should not deal with a great number of subjects at the same time: a good plan is to display a poster dealing with one topic each week under the heading—"this week's health message". They must be designed with care for the population and age-group for which they are intended. The bad poster is often wrongly interpreted.

Models and exhibits are most effective. Those produced in the modern style are expensive, but this is unavoidable if they are to compete with commercial advertising. Some can be obtained on loan. There is a place, also, for simple and cheap models made from paper, cardboard and so on—their construction forms a useful exercise for the young.

The **flannel-graph** is a modern and most telling device for illustrating a talk. Appropriate objects, words and figures are cut out of felt, flannel or lint-backed paper, and used to build up a picture piece-by-piece. The background is a square of black or green flannel to which the pieces stick. They can be made easily by those taking part in group-discussion and by others receiving health instruction: the planning of a topic and its illustration by this means is of itself a potent health lesson.

Health exhibitions are very costly and take a great deal of organising. They repay careful planning, but the chief criticism of

them is that their effects are not lasting, unless followed up regularly by other forms of propaganda.

Expert advice on these matters and on all aspects of health education may be obtained from the Central Council for Health Education, Tavistock House, London, W.C.1.

DENTAL HEALTH EDUCATION

There is a tendency to consider dental hygiene on its own, as though teeth were outside the body, when, of course, they are just as much a part of it as the eyes, hair, nails or skin. Teeth are affected by the body nutrition, and they show changes in many diseases. For these reasons, dental care, although it has special features such as the regular cleansing of the mouth and teeth and the need for periodic inspection, is an integral part of general health education.

The dental state of children and young people is a cause for concern. Decaying teeth are too common, and the improvement in this direction is well below that in the national health generally. Preventive dentistry starts in the home, a truth emphasised by the Chief Medical Officer of the Ministry of Health: "Nowhere in public health does effective prevention depend so much on parental attitude as in the field of oral health".

Difficulty during the post-war period in providing adequate dental inspection of mothers and children, hereditary influences, dietary deficiencies and wrong food habits are among the causes of dental decay (caries). Points to which parents should pay particular attention in order to preserve children's teeth are:

(i) Wholesome regular meals.
(ii) Avoidance of snacks between meals, especially sweets and confectionery.
(iii) Proper cleaning of teeth—at least night and morning.
(iv) Regard to early feeding habits of infants—wrong feeding may develop a craving for sweet foods which are harmful.
(v) Seeking early and regular advice and treatment, and ensuring that this is followed.
(vi) Attention to general health propaganda.

FLUORIDATION

It has now been well-established that the element fluorine, present in nature as fluoride, increases the body resistance to dental

caries. Surveys in many countries, including Britain, have shown that the presence of small amounts of this substance in drinking water, has resulted in a striking improvement in the dental condition of children. For this reason, medical and dental authorities advocate the addition of one part per million of fluoride (a concentration which is harmless) to water supplies in areas where it is not present—or not in sufficient amount—naturally. The water supplies for thirty million people in the United States are now being treated in this way as a routine public health practice.

THE AIMS OF HEALTH EDUCATION

It has been learned that one of the objects of health education is to inform people, to give them facts so that they may the better understand the reasons behind health principles and precepts.

The three aims of health education as defined by an expert committee of the World Health Organisation are:

(i) To ensure that the community regards health as an asset.
(ii) To equip the individual with skills, knowledge and attitudes to help him solve his own health problems.
(iii) To promote the development of the health services.

But, more important still, is the application of this knowledge; no easy task, when ingrained habits and customs have sometimes to be broken down, and personal likes and dislikes, as well as prejudices and emotions, counteracted.

Success depends not only on expert teaching, but on sympathy, patience and the correct approach appropriate to the age, sex, personality and the social and educational background of those to whom it is directed.

Advice, guidance and practical help go shoulder to shoulder with teaching.

The maximum effort must be directed towards children and young people so that good habits may be formed early. As has been said, there is an important place for indirect instruction—"teach them knowing not they learn it".

The foundations are laid in the home. Wise parents take every opportunity of improving their health knowledge, so do sensible young people preparing for marriage. Children who practise at home what they have learned at school or youth centres can stimulate indifferent parents to follow suit.

CHAPTER VIII

COMMUNICABLE DISEASES

The **communicable or infectious diseases** are those that spread from man to man or from animal to man. At one time they were divided into two groups—contagious (spread by close contact) and infectious (carried by the air). Such a distinction is not now made. There are three requisites: (a) a person or animal having the disease or being a carrier of it; (b) a suitable means of conveying the infection; (c) a susceptible individual.

The route along which infection travels from the infected to the healthy may be likened to a bridge of three or more spans. If any one span is destroyed the infection cannot pass. This is never a simple procedure in practice and in the control of communicable diseases an attack is made on all the sections of the bridge.

The first span (A) depicts the infected person whether sick or merely harbouring the germs; the middle one (B) (which may have several parts) signifies the ways in which the infection can be transmitted to others; the last span (C) represents the uninfected, but susceptible individual (*fig.* 9).

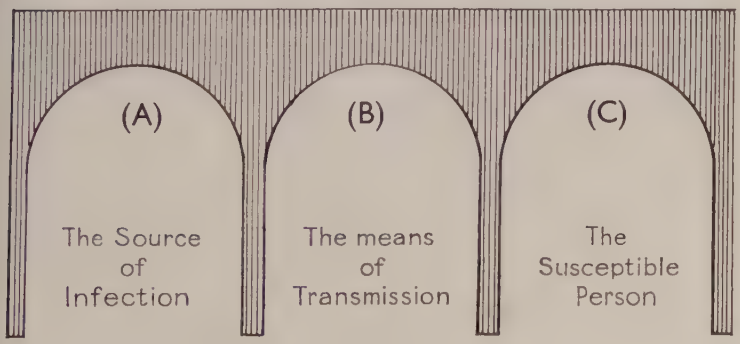


FIG. 9.

The causal agents are parasites, whether they be bacteria and viruses (members of the plant family); protozoa (the single-celled animals that cause malaria, African sleeping sickness, and amoebic dysentery); fungi; or helminths (worms). It is customary to allude only to illness caused by the last three as **parasitic disease.** Parasites (the word really means "eating with another") are found in or on all animals. They live the whole or part of their lives on another living thing or they may be parasitic for certain phases of their existence only. As will be seen, the helminths of medical importance are chiefly confined to tropical regions. Insects and mites, many of which are parasitic to man, are very important carriers of disease, but they may of themselves cause local and general disturbances.

BACTERIA AND VIRUSES

In order to cause illness these minute organisms must not only find a way of entering the body, but of multiplying within it. Whether or not disease results depends on the number and virulence of the germs and the amount of resistance shown by the host. These and the other parasites must also have a means of leaving the body and infecting another animal, if they are to survive: as will be seen, they do this in a variety of ways.

Viruses are even smaller than bacteria, and unlike them, they can only be cultured in living cells; fertile eggs and tissue cultures are used for laboratory growth. Poisons (toxins) formed when microorganisms multiply in the body, account for many of the symptoms —headache, fever, etc.—which accompany infection. It is only rarely that toxins formed outside the body cause illness. This happens when food, in which multiplication of bacteria has been allowed to take place, is eaten. The toxin may be deadly, as in botulism, or far less poisonous in another, and commoner food infection caused by the staphylococcus. If conditions are right, bacteria reproduce themselves rapidly by dividing into two. Some do this every 20 minutes or so. (The reader is invited to calculate the offspring of a single microbe after, say, 12 hours.) Certain bacteria form *spores*, which increase their resistance to antiseptics, heat and drying; but, fortunately, there are few human parasites among them.

THE CONTROL OF INFECTION

A. THE PATIENT OR CARRIER

The infecting source may be a sick person or animal, or a carrier (one who harbours the germs without being ill). Control measures include early discovery, treatment, isolation or surveillance and disinfection. The head of the family and the doctor have a legal obligation to report the occurrence of major infectious diseases to the medical officer of health. It is called **notification.** This enables prompt action to be taken to discover the source and to prevent spreading of the disease. **Quarantine** (from the French "quarantaine"—forty days) dates from the time when crews of ships from ports where plague, cholera and yellow fever were raging, were not allowed shore contact at other ports. It is now generally replaced by isolation at home or surveillance for the quarantine period, which is a day or so longer than the incubation period of the infection concerned. Sometimes, but less often than formerly, schools may be closed. In malaria, which can only be carried by the mosquito, nursing under a mosquito-net takes the place of isolation.

Effective treatment is an important preventive measure. In days gone by there was little that could be done in this direction—one exception was the use of cinchona bark, brought from Peru in 1640; its active principle, quinine, was a specific against malaria, or ague, then common in Britain. There was no successful treatment for syphilis until 1910, when Ehrlich discovered salvarsan. The appearance of the sulpha drugs in the 1930s, enabled pneumonia, bacillary dysentery, cerebro spinal fever and gonorrhœa to be treated effectively. Penicillin came ten years later and opened up a vast new field of treatment for many other conditions Streptomycin and other preparations, are now available for the cure of tuberculosis, for the first time in its long and tragic history. New drugs appear with encouraging rapidity.

B. THE CARRIAGE OF INFECTION

The middle arch of the bridge shown on page 45 represents the way—or ways—in which infection spreads: the greater the knowledge of how this occurs, the more readily can the arch be destroyed. The main routes of infection are discussed overleaf.

1. AIRBORNE, OR DROPLET INFECTIONS

These follow the inhalation of germs from the lungs, nose, throat or mouth of sick people. Droplets carrying them travel many feet in the air, especially after sneezing or coughing. Overcrowding, poor ventilation and bad habits increase the danger. Diseases in this group include: colds, influenza, sore throats, diphtheria, mumps, cerebro spinal fever, measles, scarlet fever, whooping cough, german measles, poliomyelitis, small-pox, chicken-pox.

2. EXCREMENTAL INFECTIONS

The germs of bowel infections, present in the excrement, are swallowed in contaminated food or drink. Dirty hands and utensils also aid their passage to the mouth. The enteric fevers, amœbic and bacillary dysentery, food poisoning, infant diarrhœa, cholera and poliomyelitis are excremental infections.

3. CONTACT DISEASES

Direct contact is responsible for venereal diseases, some skin diseases, and, if over a long period, leprosy; scabies and pediculosis also come into this group. Infected articles, clothing, towels, bedding, hair brushes and combs may carry some infections. Anthrax is an example of a disease carried by hides and other animal products. Smallpox may be carried by clothing, rags, or by imported cotton, but close personal contact is the usual method of transmission.

4. INSECT-BORNE DISEASE

Insects act as (a) mechanical carriers—flies, bluebottles, etc., which carry infection to food; and (b) intermediate hosts which are essential links in the chain of infection. Diarrhœa and food poisoning are in the first category; malaria, typhus, plague and yellow fever, in which the organisms enter through the punctured skin, are in the second.

5. OTHER INOCULATION DISEASES

In addition to the above, wound infection with a variety of bacteria may take place. The saliva of an infected animal introduces the organisms of rabies (hydrophobia) into the body of a person bitten or licked. The spores of tetanus enter through wounds or burns contaminated with soil. Anthrax has been mentioned already.

6. INFECTIONS CARRIED BY ANIMALS AND BIRDS

Domestic and wild animals and birds can act as sources of human infections. They reach man directly by contact, or indirectly through insect parasites or helminths of which they are the intermediate hosts. These are potent causes of illness in many parts of the world. In this country, until quite recently, milk from tuberculous cows has been a source of much illness and many deaths. The salmonella bacteria, the commonest cause of food poisoning, are found in animal excrement. When there is poor hygiene, they reach human foodstuffs. Rats and mice carry many infections. A form of ringworm may be given to human beings by cats and dogs. Psittacosis, a virus disease of parrots, canaries and other birds, sometimes affects man. It is thought that birds play a part in the spread of foot and mouth disease in cattle, myxomatosis in rabbits, and perhaps other infections.

C. THE SUSCEPTIBLE PERSON

There are many ways of guarding people against infection. They include all those measures which raise the body resistance. Protection against certain diseases (e.g. malaria and bacillary dysentery) may be obtained by drugs; in other cases recourse can be had to physical protective devices such as mosquito nets, protective clothing, masks and repellents. These methods are discussed on other pages. An effective way of breaking this arch of our bridge is by rendering the susceptible person immune by artificial means. This is dealt with in the next sections.

THE BODY DEFENCES AGAINST INFECTION

Although exposure to germs capable of producing disease is one of man's environmental hazards, the organisms do not find it easy to break into the healthy body; even if they succeed in passing the outer defences, they are usually rendered harmless and destroyed by the body's elaborate defensive machinery. The skin, when clean and unbroken, is the first barrier. The nose, mouth and other apertures are well guarded by mucous membranes which pour out fluids in which the attacking organisms are broken up and dissolved. The saliva acts in this way and so do the tears. Should germs be swallowed in food or drink the acid gastric juices usually destroy them. When bacteria do get past, they generally die off quickly in

the new environment. They must increase in numbers before they can cause illness. The time they take to do this is known as **the incubation period,** which varies, in different diseases, from a few hours to two or three weeks, or even longer.

Once they get inside, the body cells go into action against the invaders. The white corpuscles in the blood and other large cells in the tissues destroy them by engulfing them or bursting them apart. A special group of cells, when acted on by the poisons (or toxins) produced by germs, manufactures **antibodies** which are poured into the blood stream. This takes a little time to happen. It is the method by which the body fights a particular infection and, as almost always happens, brings about recovery from the illness. Antibodies formed against one disease will not, however, protect against another. If they are present in the blood for a long time, they can give a life-long **immunity** (a word which means freedom from attack) against further illness. That is why second attacks of, say, chickenpox, measles or poliomyelitis are almost unknown. In a few illnesses (e.g. the common cold or influenza) immunity following an attack may last for a short period only.

It has been discovered, quite recently, that an antivirus agent—a substance antagonistic to a virus—is produced by the cells of the body when attacked by a virus. This agent has been called **interferon.** This is an important step forward, which marks the beginning of more knowledge of the complicated mechanisms which the human body has built up to defend itself against infection.

ARTIFICIAL IMMUNITY

As has been mentioned, specific antibodies may not be available in the blood for a little time after disease organisms have established themselves; obviously, then, it would be of great advantage if they could be ready in advance to prevent or cut short the illness. The fact that it is now possible, by artificial means, to induce the body to produce antibodies against a number of infections is one of the triumphs of medical science. This **artificial immunity** is brought about by injecting **vaccines,** which consist of carefully measured suspensions of the organisms against which protection is required. The germs are rendered incapable of causing illness, by being killed by heat or antiseptics, or by special

methods of culture in the laboratory. To protect against certain bacteria which produce dangerous poisons (or toxins)—the bacillus of diphtheria is one—injections are given of small doses of the toxin, neutralised to prevent any harmful effects. These processes are known as **vaccination** or **immunisation.** Vaccination (which simply means "giving a vaccine") is usually associated in the public mind with the prevention of smallpox, but vaccines against many other diseases are available; "immunisation" is a comprehensive term covering the injection of vaccines or toxins. Until recently, vaccines, in order to be effective, needed to be introduced into the body by injection through a hypodermic needle or a scratch in the skin. A vaccine against poliomyelitis has now been perfected, which can be swallowed in syrup or on a lump of sugar. It contains living, though harmless viruses, which produce antibodies within days, as against some months when other vaccines are employed. The immunity conferred also lasts longer. It forms a barrier to infection in the gut, where the poliomyelitis virus normally multiplies rapidly. There is a hope that the wide use of this vaccine will lead eventually to the complete eradication of the disease. There are encouraging results from other live vaccines, now on trial.

Artificial immunity does not last for life. Smallpox vaccination must be repeated every five years, at least, if it is to be an adequate safeguard, and in any case, immediately, if there is any risk of exposure to infection. The immunity against diphtheria given to the year-old infant has waned by school age, and it must be supplemented by a reinforcing or *booster* dose. These injections do not of themselves give the full answer to the problem of the communicable diseases: they are remarkable new weapons, indeed, but they exercise the maximum effect when used in conjunction with the established principles of personal and communal hygiene. Immunisation must never be made an excuse for disregarding these principles, which if not followed, may give rise to an unjustifiable sense of security.

Resistance to infection is influenced by other factors. These include defects or deficiencies in the diet, fatigue, and the presence of other debilitating diseases. Natural resistance also varies among individuals and races. It is now known that the mind exercises such a profound influence on the body that mental strain and anxiety,

and emotional disturbances can play a big part in the onset of physical disease. There are good grounds for assuming that in a complaint like tuberculosis of the lungs this can sometimes be one of the predisposing causes.

PASSIVE IMMUNITY

To tide over an emergency, the body can also be given rapid, though short-lived, immunity against certain fevers by other means. This **passive immunity,** as it is called, is acquired by injecting the blood serum of another person or animal, which contains the appropriate antibody. Diphtheria antitoxin, is horse serum of animals which have been actively immunised against diphtheria toxins. Since its introduction more than fifty years ago, it has saved countless lives. Anti-tetanic serum is given to persons with wounds which may have been infected with tetanus germs from the soil.

IMMUNISATION PROCEDURES

Protection against an increasing number of diseases can now be obtained artificially. It is necessary, therefore, to draw up time-tables for the immunisation of children, in order that the injections are given at the right time and are properly spaced. The family doctor or the doctor at the local authority child welfare centre will advise on these matters in individual cases. They will take into account the age and the health of the child and any special risks of exposure to infection. Schedules drawn up by the Ministry of Health serve as guides. They are based on certain important principles. For instance, the child up to six months of age has antibody against poliomyelitis, transmitted to it by the mother, therefore, immunisation is not commenced until about the seventh month. In some countries poliomyelitis is almost entirely confined to infants; in others, it is spread more evenly among the older age groups. Vaccination schemes are planned accordingly. Whooping cough deaths have steadily diminished, they are rare after one year and most frequent in the first six months of life. Most cases occur at ages between one and four years. Immunisation is recommended at one to six months or at about one year. No reinforcing doses may be indicated. Diphtheria is almost unknown in very early life,

so it may be decided to defer inoculation against it until the child is nine to twelve months old. Vaccination against smallpox is given preferably at four to five months, with revaccination between the ages of six and twelve years, but immediately if exposed to the infection. Injections of other vaccines should not be given within three weeks of smallpox vaccination. In order to reduce the number of injections, diphtheria, whooping cough and tetanus immunisation may be combined. Three of these injections, with an interval of four to six weeks between them, are necessary to establish immunity. Reinforcing, or "booster" injections must be given at eighteen to twenty-one months and again at school entry. In the Ministry schedule a further reinforcing dose between the age of eight and twelve years is recommended. The new oral vaccine against poliomyelitis—which contains all three strains of poliomyelitis virus—is given in three doses, each of three drops, at intervals of four to eight weeks. It is available for persons over six months and under forty years of age, and others who may be exposed to special risks.

B.C.G. (the bacillus of Calmette and Guérin) is a vaccine discovered by two French doctors half a century ago. It consists of tubercle bacilli of the strain found in cattle, which after prolonged culture, can no longer give rise to tuberculosis in those injected, but can nevertheless produce immunity. It is given to contacts of tuberculous persons, to school children at about the age of ten to fourteen years, and to nurses and others who may be liable to infection, if skin tests with tuberculin (a product of the tubercle bacillus) show that they have not yet been infected. Millions of injections of B.C.G. have been given since the last war, on a world-wide scale.

A vaccine has now been produced against influenza. There is more than one type of the virus, and the strains may vary in different epidemics. It is said that artificial immunity is short lived, but immunisation may be given to those at special risk, and, perhaps, on a wider scale when the indications are that an epidemic is to be expected. Vaccination against the common cold is not yet available, but as research proceeds there are grounds for optimism that one day this annoying virus illness will be brought under control.

It must be made clear that even recent immunisation may not always give complete immunity. For example, whooping cough may occur in immunised children, but should this happen the symptoms are significantly milder. On the other hand, recent successful vaccination against smallpox is a certain safeguard, and even after exposure to infection, vaccination within two or three days usually protects. If done within the next day or so it may modify the attack, but if later it is unlikely that it will prevent the disease.

Protection by immunisation may also be obtained against yellow fever, typhoid fevers, cholera, typhus and plague. It is used in those countries where these diseases are prevalent.

PARASITIC DISEASES

Although far more common abroad, parasitic worms do infest people in Britain. The eggs are swallowed when uncooked or partly-cooked fish or meat are eaten, when they are present in vegetables and salads contaminated with soil or excrement, or when the hands convey them to the mouth after contact with domestic animals. Children reinfest themselves with thread worms when the fingers are sucked after scratching. The eggs deposited around the anus are sticky and get under the nails, they adhere to articles touched by the child and so may infest other persons as well.

Tape worms have intermediate hosts, the adult stage is passed in man, the larval in another animal, or vice versa. The tiny **thread worms** however, are human parasites, often infesting many members of the family.

Worms cause much ill-health in the world, more particularly among peoples of undeveloped countries where hygiene is not practised. They cause malnutrition and anæmia and produce toxins. **Hookworm** disease is an example: the larvæ flourish in damp, warm earth, penetrate the skin, and become adult worms in the human intestine. Miners working under conditions favourable to the parasite are very prone to attack. Hygienic measures have eliminated hookworm from this country. Other worms also pass the larval stage in water, using snails, water spiders and fish as intermediate hosts. Good habits, proper sanitation, sterilisation of water

supplies and destruction of water snails, etc., break the life-cycle.

Larvæ in meat carcases make them unfit for human consumption, they cause conditions such as **"measles"** in beef and pork. Inspection of carcases at slaughter houses and of imported meat is a routine task of inspectors in the public health department; it is a valuable preventive service. Experimental work suggests that it may be possible to immunise animals against some of these parasites.

OTHER PARASITIC DISEASES

Fungus diseases are more common in the tropics, but at one time **ringworm** was frequent among children in this country. One form of it comes from cats and dogs, the other is only found in man. School children and family members may be affected by contact; hair brushes and combs in common use transmit it also.

Athlete's foot (foot-rot) has undoubtedly spread in recent years. It is a form of ringworm which flourishes where the skin is warm and moist (e.g. between the toes). Young men, especially soldiers, students and miners, are particularly liable to fungus infection. It is picked up by the bare feet from the floors of ablution rooms and swimming baths, and from socks, underclothing, towels and footwear. The sharing of these articles is clearly undesirable. Thorough washing and disinfection are essential if reinfestation is to be avoided. Cleanliness in baths, where footbaths containing a chlorine solution are recommended, is of the utmost importance, but even with these precautions the condition is difficult to prevent. Foot inspection, treatment—which is now very successful—at an early stage, personal cleanliness, the use of dusting powders, and a realisation that the fungus may spread in the home by way of clothing, slippers, bathroom floors and mats, are basic principles in prevention. All cases of athlete's foot are not due to a fungus. Other organisms may be present, or there may be sensitivity to the materials of shoes or stockings. The replacement of tight, heavy shoes—which cause pressure and overheating—by looser and lighter footwear, is sometimes of help, and so is the twice daily use of a dusting powder. Medical advice should be sought if the trouble persists. There is more to be learned about this condition.

Plantar warts (verrucae), although caused by a virus may be

mentioned conveniently here. They are infectious, and are readily spread from person to person in bathrooms, swimming baths and gymnasia. Infected bath-mats and floors, and shared sports shoes are among the vehicles of infection. Early detection—regular foot inspections in schools, etc., are desirable—followed by treatment until the condition has been cured, are important means of preventing the infection from spreading. (See also *Athlete's foot*, page 55.)

CHAPTER IX

INSECTS AND VERMIN

Insects form the largest class in the animal kingdom. More than half a million species have been described, and their bulk is said to be equal to that of all the other animals on land. No wonder, then, that their influence on the history of the world has been so great!

A description of the structure of insects and other arthropods such as mites and ticks, and of their complex life histories is not within the scope of this book; but something must be known about them if their action as parasites and disease carriers is to be understood, and the reasons for special methods of control appreciated. They are among the oldest forms of life, so they have had many millions of years in which to learn to adapt themselves in order to survive and multiply. In most of them, between the egg and the adult stage, a **metamorphosis** (transformation) takes place in which the larva (maggot, grub or caterpillar) whose function it is to gorge itself with food, can live an independent existence (*fig.* 10). Some, like the mosquito larvæ, swim about in water, others develop on the living flesh of other animals, or in dust, manure-heaps or clothing. Many insects are blood-suckers, using fine tubes like hypodermic needles causing no immediate pain when inserted

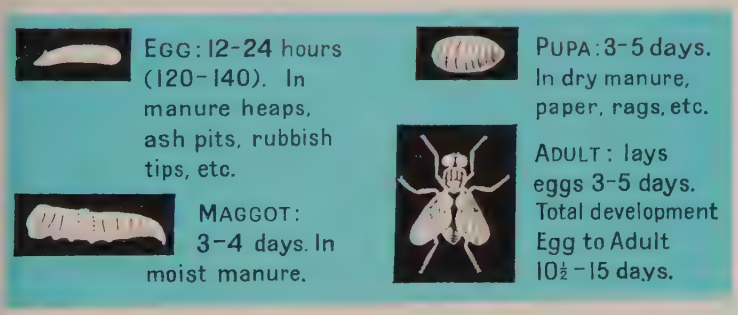


FIG. 10: HOUSE FLY

(mosquitoes), or strong mouthparts (stable flies) which give a painful bite: the saliva they inject to prevent the blood coagulating causes the local reaction which follows. The injection of disease germs takes place in this way—it is accidental. Sometimes a parasitic insect uses a domestic or wild animal as a host as well as man.

There are also blood-sucking larvæ, such as those of the irritating harvest mite, and of a mite found in the Far East which carries scrub-typhus.

"GOOD" AND "BAD" INSECTS

Relatively few insects are directly injurious to man, for he is more able to protect himself than are plants and other animals. The "good" insects include silkworms (caterpillars of moths); bees which pollinate plants; beetles which make dyes (cochineal) or act as scavengers of decaying matter; and a host of others that prey on different insects, as the ladybird does on the green fly. The "bad" ones destroy vast amounts of fruit, vegetation and stored grain, depleting the world's food supplies and causing famine; clothing, books and fabrics are eaten away; furniture and the woodwork of buildings are damaged. Apart from being carriers of disease, some insects directly injure the skin, and become a real nuisance to man and beast; so man has always needed to wage war on insects—it has been necessary for his survival. But without knowledge and effective weapons he has been hard put in the past to keep them at bay. The fight is now being waged more relentlessly and more successfully than ever before (*figs.* 10 & 11).

DIRECT EFFECTS OF INSECT BITES

Skin irritation causes discomfort and loss of sleep. Scratching allows secondary infection to take place, giving rise to skin eruptions such as impetigo; when the body and the clothing are not kept clean, this is a major risk. Far more serious is the danger of typhus, a disease which, fortunately, is no longer found in Britain: scratching when the skin is infested with lice, enables the typhus organisms present in the louse excrement to gain entry to the body.

Poisons injected by insects have caused illness as well as local symptoms. People show marked differences in susceptibility to bites, some seeming to have a relative immunity. Bees and wasps

(and scorpions, spiders and other insects abroad) although not parasites of man, sometimes sting accidentally. Persons sensitised by earlier stings, react severely and death may follow. The popular local treatment of stings probably does little good, but those who have experienced severe reactions in the past should seek medical advice on the prompt action to be taken should they be stung again. The hairs of certain caterpillars if coming in contact with the skin produce blisters. During the war, troops in Africa were much inconvenienced by migratory caterpillars which found their way into clothing and blankets; a scabies-like eruption was the sequel.

The small parasitic mites are numerous. Grain handlers are attacked by mites which dig into the skin. The larvæ of the harvest mite are very annoying to farm workers and picnickers: they crawl in at the ankles, wrists, and neck, but a good repellent rubbed into the socks and clothing near these points of entry keeps them away. The red-bird-mite found on poultry and caged birds will suck human blood given the opportunity. The itch-mite that causes **scabies** is however, the only mite that is a permanent parasite of man.

SCABIES

Scabies has been known for centuries. There was a great deal of it during the last war, but although the "epidemic" has died down many cases still occur. The itch-mite makes a burrow in the skin, preferring the parts where the flesh is loose—between the fingers, at the wrists and elbows very often—and lays eggs which hatch in three to four days. The larvæ moult and form nymphs which again moult before becoming adults, 0.3 mm. long. Burrowing takes place at all the stages giving rise to much irritation which is worse at night. It is imperative that the condition be recognised early before secondary infection takes place. Treatment on two successive days must be thorough. Scabies is spread by close contact rather than by infested clothing and blankets. It is a family disease, easily contracted by those who sleep together.

INSECTS

PEDICULOSIS (LOUSE INFESTATION)

There are three varieties of lice that feed on man: head and body-lice which are almost identical, and pubic or crab-lice which

are a different species. The body-louse long ago adapted itself to live on the body when man started to wear clothing, and to lay its eggs on the fibres instead of on hair. The eggs of each variety are attached with a powerful cement that defies all ordinary methods of dissolving it. Those on the head are fastened near the scalp, and after the larvæ have emerged, in about a week, the empty case, or nit, remains attached to the growing hair.

Each mammal has its own variety of louse, so human infestation can only take place from man to man and not from animal to man. Lice can travel about nine inches a minute. They are susceptible to changes of temperature—leaving the patient with a high fever and not surviving long away from a human host. Infestation commonly follows close contact in dirty households, but contaminated blankets and clothing or seats may be responsible. Except on an occasional vagrant, body-lice are infrequently found nowadays in this part of the world; unfortunately, however, the same cannot be said of head-lice. During the war-years some 50 per cent of women and children harboured these parasites, and since then the decline, though marked, is still not rapid enough in some industrial areas. The permanent wave which does not permit of the hair being combed or cleansed regularly has been blamed. Head-louse infestation is another of the family infestations, and treatment of school children is often followed by early recurrence if the other members of the family are not examined and treated at the same time. With this end in view, supplies of the new insecticides may now be provided by the local authority, for use in the home.

The louse no longer carries diseases in Britain, but abroad it is a vector of **typhus, trench fever** and **relapsing fever.** As in scabies, irritation, loss of sleep and secondary infection are associated with pediculosis. The presence of lice is most repugnant to people with clean habits who become infested accidentally, but eradication is simple when there is regular washing, bathing and changing of underclothes and bedclothes. The sharing of brushes and combs is obviously to be avoided.

The new preparations containing D.D.T. or Gammexane are much superior to those available before the war. They have the advantage of being *persistent*—that is, they continue to kill the insects as they hatch, and so prevent reinfestation. They should, therefore, be left on the hair for a few days, and when incorporated

in hair washes and shampoos this causes no inconvenience and does not render the subject conspicuous. Treatment should be repeated after seven days. During the war, soldiers in typhus areas were issued with shirts impregnated with D.D.T. as a safeguard.

The pubic louse lives on the hair at the crutch or around the anus, but it may migrate to other parts. Treatment is the same as for other louse infestation, and a D.D.T. dusting powder may also be used. Shaving of the hair is no longer necessary. The life history of this insect is still a little obscure, but invasion appears to take place sometimes during sexual intercourse, and occasionally from infested seats and towels.*

FLEAS

Unlike lice, which have only one host, fleas normally parasitic on a particular host will bite others, including man if they are given the opportunity. In the home dogs and cats form a reservoir, but the human flea (*pulex irritans*) is the variety commonly encountered. The rat flea, also found on other rodents, is dangerous because it can be a carrier of plague and murine typhus. There are a thousand different kinds of fleas.

Fleas also differ from lice in undergoing metamorphosis. Eggs laid on the clothing—fur or feathers in animals or birds—become larvæ which live and feed in the dust or mats on the floors of living rooms and bedrooms, or in kennels and nests. They spin cocoons in which they are able to lie dormant for a long time, which explains why people entering unoccupied houses are sometimes extensively bitten. It is said the insects become alert when there is vibration of the flooring. The adult flea lives only on blood, the larva on organic matter it finds on unclean floors.

As always, cleanliness of the person, the house and the domestic pets is the keynote of prevention: soap and water, and now the vacuum cleaner, are great enemies of the flea. Rooms heavily infested may need fumigation or spraying with an insecticide, so may dog kennels. Rat and mouse infestation must be eliminated and the holes and runs dusted or sprayed with a D.D.T. or other suitable preparation. A flea may leap on to the body (it can jump seven to eight inches) in a public building or a crowd, but this does not give rise to more than transient infestation in those of cleanly

*See Chapter X, Page 68.

habits. Persons entering premises suspected of harbouring fleas can be protected by the application of a repellent (such as dimethylphthalate) to the clothing at the ankles and wrists.

MOSQUITOES

These insects are among the most dangerous of human foes because they are the sole means of carrying malaria from one person to another. Each year 300 million people suffer from this infection, and many of them die of it. The poor health of those who live in malaria-stricken countries prevents their working to full capacity in the fields and elsewhere and distress and poverty are the result. One tribe of mosquitoes (*culicines*) carries yellow fever, dengue and the eggs of the filaria worm; malaria is carried by *anopheles* mosquitoes.

The mosquito passes all the stages from egg to adult in water, different species preferring different locations—stagnant water in marshes, salt marshes and ditches, slow-running water, water exposed to sunlight, or small accumulations in tins, rainwater tanks or ponds. The female feeds on human or animal blood; the male does not bite.

Malaria is not often met with outside tropical and sub-tropical countries, although there was a time when "the ague" was prevalent in Britain. The malaria parasite requires a warm temperature to survive and multiply. When a mosquito bites a malaria sufferer the parasites are drawn up with the blood and, after a period in the stomach of the mosquito in which they change from sexual to non-sexual forms (about 12 days), they find their way to the salivary glands. When next the mosquito takes a meal the parasites find a new victim who in due course will have a malarial attack.

Mosquitoes, even when they carry no disease, can be most aggravating, especially those that enter houses. They usually bite at night, resting in dark corners in houses or animal sheds by day. (Midges, very much smaller insects, can bite fiercely, but like the mosquitoes only the females are blood-suckers. Many of them breed in water or damp soil and wood, in bracken or heather, in such numbers that they can seriously affect workers out of doors and deter holiday makers. Eradication of breeding places is not easy, and repellents are the best safeguard.)

Mosquitoes are attacked in the larval stage and as adults. Space

does not permit of more than a very brief account of the malaria eradication schemes which are being intensified throughout the world today. Breeding places are eliminated by drainage, canalisation and other methods. Spraying of ditches and swamps is carried out by hand or from the air. Houses and cattle sheds are sprayed with a persistent insecticide to kill the adults. Personal measures include the prompt treatment of cases, who of course, are nursed under mosquito nets. Nets are used as a routine in malarious areas. As little of the body as possible should be exposed by those out of doors at night (during the war when there was a malaria risk, sleeves were unrolled, trousers were worn instead of shorts, and sentries wore gauntlets and veils; hands, face and ankles were smeared with a repellent; the new malaria-suppressive drugs were taken regularly). In this country many of these rules can be followed when mosquitoes become a nuisance. A search will often reveal a pond or other collection of water containing mosquito larvæ near a house or camp; campers should choose high ground rather than low-lying sites.

HOUSEFLIES

Houseflies, which include the common housefly (*musca domestica*) and the lesser housefly (*fannia*), are not biting insects; nevertheless they are responsible for human disease by infecting food and utensils. The common housefly can carry any of the bowel infections—bacillary dysentery, food poisoning, typhoid, and, in other countries, cholera, amœbic dysentery and eye infections. Where sanitation is primitive, flies have been found to harbour polio virus. Flies were also blamed for infant diarrhœa outbreaks, once so common (*fig.* 11).

The fly will eat nearly everything, and its habits of vomiting and passing fæces when feeding, encourage bacterial contamination. Bacteria are also carried on the legs and body from manure heaps to human food.

The eggs are laid on manure or other collections of decaying animal and vegetable matter, such as those in dustbins and on refuse-heaps. The larvæ, which appear in 8 to 48 hours, burrow into the refuse. At the end of a week they have become ½ inch long, they then come to the surface and migrate to a cooler place. If the refuse is covered with two feet of earth they cannot find their way

Fig. 11.

out. The whitish larva is pointed at one end and rounded at the other; when it becomes a pupa it has a brown colour and an oval shape. The cycle from egg to adult is two weeks or more, but in hot countries it may be less.

Although 90 per cent of flies found indoors are common houseflies, the lesser housefly (*fannia canniculariś*) is often in evidence. Fortunately it is not so liable to contaminate food. Its breeding places are very similar to those of the larger fly, but indoors it tends to swarm around ceiling-light fittings at night.

Other small flies such as **"fruit flies"** may swarm in houses on occasion. The **blowflies** (bluebottles and greenbottles) are most obnoxious, since they lay their eggs on meat, causing "blown meat". **Stable flies** which are blood sucking, occasionally find their way into houses. Their bites are painful.

CONTROL OF FLIES

It is evident that the main principle in prevention is the elimination of breeding places. Dustbins should always be covered with

well-fitting lids; refuse and manure heaps should not be allowed to accumulate near human dwellings, and if they exist, spraying with D.D.T. or other contact insecticide is essential. Controlled tipping has now displaced indiscriminate dumping of municipal refuse. The refuse is deposited in layers not deeper than six feet, and covered with nine inches of earth, the rise in temperature being sufficient to kill fly larvæ.

Flies are denied access to human food by using flyproof larders, and covering milk jugs and food dishes with gauze. Fly papers and fly traps are still used extensively, but a thorough spraying of kitchens and mess rooms with a persistent insecticide (all food being protected during the operation) is preferable. An aerosol spray is effective also. Since flies prefer narrow surfaces to flat ones such as tables, wire frames impregnated with D.D.T., dieldrin, or B.H.C. have come into use. A portable wooden frame about 18 inches square, covered with a mesh of string soaked in one of these insecticides may be moved to the part of a room where flies gather; an impregnated wire mesh hanging from the ceiling is effective in large rooms. Pyrethrum sprays give a rapid knockdown of flies.

It is surprising that flies should continue to be a nuisance and a danger to health in this country when the means of preventing breeding and killing adults are available. This is a matter which requires far more attention and greater individual effort.

BED BUGS

Bed bugs have been a nuisance to man from the earliest times. They are not known to transmit disease. They feed only on the blood of man and animals, coming out at night from the cracks and crevices in which they live to do so. Bed bugs are found most frequently in old dwellings and are indicative of poor standards of cleanliness and a failure to make a vigorous attack on the insects. They have been introduced into new houses by furniture and firewood.

Previous methods of getting rid of bed bugs were often ineffective because the insecticides could not reach the breeding places in tiny cracks, behind skirting boards, picture rails and elsewhere. Modern insecticides are completely successful; spraying of walls and bed-frames or the painting of "mayonnaise-like" preparations in strips on the walls, so that the insects must cross them when they emerge,

are among the methods adopted. A room so treated remains lethal to these pests for many months. Furniture can be treated at the disinfecting station. The local authority services are available for this and other forms of disinfestation.

COCKROACHES

Cockroaches are not human parasites, but they are far too common inhabitants of bakehouses and kitchens. They conceal themselves by day in warm moist places, near stoves or behind hot water pipes, emerging at night to eat whatever food they find lying about. Since they crawl over the food they are capable of infecting it with bacteria or depositing on it the eggs of intestinal worms.

Kitchen cleanliness and the protection of all food are the first steps, but, in addition careful sealing of cracks and holes and hot water pipe covers is necessary. Insecticide powders and sprays must be used with care: lacquers and emulsions containing D.D.T. or similar insecticide have proved most effective.

VERMIN

RATS AND MICE

The word "vermin" (from the Latin *vermis*, "a worm") is now used to describe insects or animals which are "noxious", "offensive" or "destructive": rats and mice have every reason to be placed in this category. They are of economic as well as public health importance, for not only do they spread disease, but they devour or spoil great quantities of foodstuffs in fields or in stores. The rat will gnaw through anything in its path—woodwork, lead pipes, electric cables—damaging buildings and sometimes causing fires or the collapse of roadways. Rats and mice multiply rapidly, so it is essential to take prompt action to prevent their establishing themselves. Whilst rodent control is a duty of local authorities (they have experts to do the work), every occupier of land or a building must, by law, give notice if these vermin are discovered in substantial numbers. On board ship, rats, which may transmit plague, must also be controlled.

There are two species of rat, called the Black and the Brown, although there is little difference in their colour. The brown rat invaded Britain in the seventeenth century and almost exterminated the smaller black rat which is now found only near the ports and

prefers to live in buildings, subsisting chiefly on grain. The heavier brown rat, which came from China originally, burrows in hedges, ricks and the ground floors of buildings. Rats can survive at low temperatures such as those of cold stores.

Rat destruction must be carried out skilfully if it is to be successful. These animals are shy of most poison bait, and prebaiting with a poison-free food has long been the practice. The new poisons include dicoumarol which prevents the blood from clotting, and sodium fluoracetate, which is used in sewer treatment. All these substances are dangerous poisons and should only be used by experts. Fumigation may be used in ships and warehouses. The householder should consult the local authority before attempting to get rid of rats and mice by poisoning.

Rats and mice if they contaminate food or water are liable to cause a number of diseases, which include **food poisoning,** a severe form of **jaundice,** the worm infestation (**trichiniasis**) which affects pigs after eating rat carcases; and, of course, **plague,** which is carried by the rat flea.

CHAPTER X

DISINFECTION AND DISINFESTATION

Disinfection is the process of destroying organisms that cause infection. Dry heat or steam, certain chemicals known as **disinfectants,** ultra-violet rays, and, more recently, atomic radiations, can act in this way.

Disinfection after infectious diseases—**terminal disinfection**—was at one time a routine procedure. The room was sealed and then fumigated with formaldehyde or sulphur, clothing and bedding being treated at the disinfecting station. Except after major infections such as smallpox this is no longer a regular practice. It is more rational to carry out **concurrent disinfection,** which aims at preventing the spread of infection at the time of illness. Good ventilation, scrupulous cleanliness, the disposal of dressings and paper handkerchiefs by burning, the use of disinfectant solutions for soiled articles and for rinsing the hands, are some of the maxims. Afterwards the room is thoroughly cleansed with soap and water, the windows opened wide and the bedclothes hung on the line: sunlight is a good disinfector. If required, clothing and articles may be sterilized at the local authority disinfecting station.

Boiling for a few minutes is the easiest method of killing bacteria but spores are more resistant and boiling for an hour may be necessary. Articles soiled with discharges should be soaked in a carbolic or cresol (5 per cent) solution for half a day before washing. Cups, saucers and other utensils are sterilized by dry heat or steam or by soaking in a solution of potassium permanganate (1 : 1,000) for five to ten minutes. The medical officer of health will advise.

A deodorant is not a disinfectant—it simply masks an unpleasant smell which is generally a sign of dirt and filth.

The destruction of insects and their eggs is known as **disinfestation.** It has already been mentioned, but some further details are necessary.

Dry heat and steam have long been used to kill lice on clothing and bedding, soldiers, in particular, using this method in impro-

vised apparatus in the field in typhus areas. A large number of substances, vegetable and chemical, have been used as **insecticides,** but until the discovery of D.D.T. during the war years, none was entirely satisfactory. Pyrethrum, obtained from the flowers of a plant grown chiefly in the Far East (and now in Kenya), was one of the best. It is used in fly-sprays, and has a quick knock-down effect when coming in direct contact with the insects, but it has no lasting effect. Its advantages are its comparative harmlessness to man and domestic animals, and the fact that insects do not acquire a resistance to it.

RESIDUAL INSECTICIDES

When supplies of pyrethrum were cut off during the war, search was made for a chemical substitute. A Swiss chemist found that a substance which had been discovered many years before had remarkable insecticidal properties. This was D.D.T. (dichlor-diphenyl-trichlorethane). Since then other substances in the same chemical group (chlorinated hydrocarbons) have been brought to light which have very similar properties. These include B.H.C. (benzene hexachloride), dieldrin, chlordane and aldrin. The introduction of these insecticides has revolutionised disinfestation methods. They act chiefly by contact, and although taking a much longer time to kill than pyrethrum, their action on the nervous system of the insects invariably proves fatal in due course. When standard preparations are employed and they are applied properly there is little risk of toxicity to man. Pyrethrum is often added to sprays containing contact insecticides in order to give an immediate as well as a lasting effect. Insects have shown no resistance to it.

D.D.T. and its fellows have another outstanding advantage: they have a *residual* action. This means that treated surfaces continue to be lethal to insects in contact with them, for long periods; thus successive crops of larvæ are killed as they hatch.

Different types of insects vary in their susceptibility to the contact insecticides. This is a matter on which the advice of the public health department should be sought, indeed, the indiscriminate use of these preparations is liable to prove ineffective.

Unfortunately, certain insects are showing *resistance* to D.D.T. and other chemicals in the same group, and here again it is essential to obtain expert advice. Another class of insecticide brought into

use since the war, especially in agriculture, contains phosphorus. These substances are very poisonous and unless used with great care are liable to produce poisoning in man and animals: some new preparations of this type are, however, safe to use. Those who spray these chemicals should take suitable precautions. These are given in Ministry of Agriculture & Fisheries circulars issued periodically.

Among the preparations containing residual insecticides now available are dusts, smokes, emulsions, lacquers and paints, and aerosols. Aerosol dispensers containing carbon dioxide or freon gas are ideal for use in confined spaces such as aircraft.*

IMPREGNATED CLOTHING AND REPELLENTS

Clothing impregnated with chemicals which kill or repel insects and mites was used with success during the last war. For example, shirts treated with D.D.T. proved a safeguard against louse infestation in areas where a typhus risk existed; and the mite vectors of scrub typhus—a serious disease in the Far East—were killed by treating shirts, trousers and socks with a new preparation, **dibutyl phthalate.** Mite infestation may also be prevented by impregnating clothing with **benzyl benzoate,** which has been used so effectively in the treatment of scabies. Special soaps have also been advocated for this purpose.

Liquids and creams applied to the skin have long been used as a measure of personal protection against insect bites, especially mosquitoes. Oil of citronella, camphor and cedar wood oil were the most popular; their effectiveness was variable and of short duration. The modern insect repellents and miticides which are much more satisfactory and longer lasting, include dimethyl phthalate (D.M.P.), dibutyl phthalate (D.B.P.) and indalone. D.M.P., which is commonly used in this country as a 40 per cent cream, is a clear, non-greasy fluid which has a repellent action for from three to five hours: it should not be allowed to get into the eyes. Since the repellent or lethal action of these substances on insects or mites varies, it is customary to use mixtures of them, such mixtures are found to be more effective than when the individual constituents are used separately. An interesting finding has been that when

*Some aerosol preparations sold to the public are inflammable and may be injurious to health if not used properly. The directions must be followed carefully.

wide-meshed netting, which would normally allow insects to pass through, is treated with these repellents, it becomes fully protective.

Dust-guns charged with an insecticide powder containing D.D.T. or B.H.C., may be used to disinfest blankets or clothing. At Naples, during the war, the whole population was dusted in this way. The procedure has the advantage that it can be carried out on the fully-clothed individual. By this method a typhus outbreak was cut short in the winter months—a feat never before accomplished.

FIG. 12.

FIG. 13.

CHAPTER XI

THE CHANGING PATTERN OF DISEASE

I. THE DECLINE IN THE BACTERIAL INFECTIONS

When the public health service was born in Britain a hundred years ago, its main efforts were directed against the communicable diseases, the "fevers", which afflicted and killed people in great numbers. The very young were most affected. The appalling conditions of living fostered the spread of these conditions. Sanitary reform played a big part in the decline of excremental diseases, of which typhoid, cholera and infantile diarrhœa were the most serious. Better housing, feeding, working conditions, education, and social reform generally, exercised a slow, but sure influence. Improved personal cleanliness gradually eliminated illnesses like louse-borne typhus. The droplet infections were not as easy to bring under control, but success began to be achieved as many factors came into operation. These are discussed in more detail on other pages of this book: among them are health education to counteract apathy and ignorance, an expanding medical and personal health service, better homes—clean, well ventilated and not overcrowded, immunisation, and the natural history of infections which tend to wax and wane in virulence.

The extent to which these infections have declined and the nations' health has improved is shown by the following records for England and Wales:

Infant mortality rate (deaths of children under one year)—in 1860, 150 per 1,000 births; in 1960, 21.

Respiratory tuberculosis—in 1850, 50,000 deaths; in 1960, 3,000.

Cholera—between 1848 and 1854, 54,000 deaths; the last outbreak was in 1893.

Enteric fevers—in 1870, 400 deaths per million population; in 1960 there were 3 deaths in all.

Smallpox—caused 44,000 deaths between 1870 and 1873.

Scarlet fever—responsible for a death-rate of 2,500 per million children under 5, in 1860; there were no deaths in 1960.

Whooping cough, diphtheria and **measles**—each killed about 1,500 children per million under 5 in any one year during the mid-nineteenth century. In 1960 the actual number of deaths from these complaints was 37, 5, and 31, respectively.

Typhus—was responsible for 23,000 deaths between 1869 and 1883. It no longer occurs in this country.

Infantile diarrhœa—during the last century the death-rate was enormous—it has always been higher among illegitimate babies and when sanitation was poor and habits bad; it is no longer a major cause of infant death, but it is too prevalent, still.

II. INFECTIOUS DISEASES TODAY

Despite this remarkable decline, some of the communicable diseases in this country are by no means done with. The following notes give the present position of the most important of these diseases.

TUBERCULOSIS

The steady fall in the death-rate from tuberculosis should not be allowed to mask the need for continued preventive effort. Never before in its long history have the prospects of reducing this disease to a position of minor importance been so hopeful. More than anything else, this is a matter for full co-operation by the public. Treatment is now most effective, and the preventive services have been developed to an extent not exceeded anywhere in the world. X-ray examination of the chest by mass radiography is available to everyone and full advantage should be taken of this means of detecting the disease early, so that cure is assured and the danger of infecting others removed. Older persons—chiefly males—appear to form the main reservoir of infection, but often these people show few symptoms (except "bronchitis"!), and are able to get about, entering shops and public transport, and possibly infecting others. Unfortunately, relatively few old people make use of the mass radiography service. When they do, it is found that the number with tuberculosis requiring treatment is proportionately high.

For many people, treatment has become largely a matter of taking tablets without a long stay at a sanatorium; but during the

period of cure, it is vitally important to do everything possible to prevent spreading the disease to children and others. Great care must be exercised in limiting droplet infection when coughing and in disposing of infectious sputum. Bottles and disinfectant are available at the Chest Clinic for this purpose. Paper handkerchiefs should be burned promptly. The use of B.C.G. is discussed on page 53.

When a case of tuberculosis occurs, family contacts and others associated with the patient at work or in school are asked to attend the Chest Clinic for a check. This may include a tuberculin test—especially in children and young people—to find out whether infection has taken place. (Most adults are normally positive to this test, which merely indicates that, like nearly everyone else, they have been infected at some time or other, without actually getting tuberculosis. It is a test of infection, not of disease.) The chest is X-rayed when necessary and contacts are advised to attend at regular intervals for a few years. This is an important safeguard, which, unfortunately, is too often disregarded. When a child is found to have become infected (and the proportion is now very small) careful enquiry will often reveal an unsuspected source of infection in the home or among relatives or friends.

That, despite its decline, tuberculosis is still of great economic importance to the country, is shown by the following figures of the number of working days lost each year on account of it (bronchitis figures are given for comparison):

Respiratory tuberculosis: 1951—21 million; 1960—11 million.
Bronchitis: 1951—26 million; 1960—29 million.

Other forms of tuberculosis principally affecting the brain, bones and joints, and glands were once very prevalent in children, causing many deaths, long periods of illness and a great amount of lasting disablement. Much of this was due to infection with a type of tubercle bacillus found in cattle, called the **bovine** type. Infected milk was the principal vehicle. As recently as fifteen years ago, it was estimated that forty per cent of cattle in Britain were infected, and samples of raw milk reaching the towns showed the presence of living organisms far too frequently. Pasteurization of milk (see page 140) was an immediate necessity, which despite initial opposition, gradually became almost universal. Bovine tuberculosis in children declined step by step with progress in pasteuriza-

tion. The problem of infected cattle was more difficult to tackle, but since the war, the progress made has been dramatic. Cattle were tested with tuberculin, and those that reacted were destroyed, compensation being paid to the farmer. In this way, **"attested"** herds were built up, and today tuberculosis in cattle has been almost eliminated. Only one positive reactor is found now in every 1,000 cows tested. This is a triumph of organisation, effort and co-operation which has resulted in bovine tuberculosis being no longer more than a slender risk to human beings. The situation has been reversed, for in the 1960s, tuberculosis in man can be a risk to his animals!

VENEREAL DISEASES

The venereal diseases have shown disturbing increases in recent years. These diseases are not notifiable to the medical officer of health, for the reason that if secrecy is maintained patients are more likely to attend treatment centres early. In 1950 there were 78,500 male and 32,300 female first attendances at these centres in England and Wales; in 1960 the numbers had risen to 94,700 and 34,800. Increases are being noted in other countries also. Prostitutes still form the large reservoir of infection, as shown by the examination of female prisoners. It is disquieting to learn that a third of the prostitutes in a London prison were aged between fifteen and twenty, of whom nearly a half suffered from gonorrhœa. The increase in promiscuity in young people, which gives cause for much anxiety, is one of the causes of the prevalence of V.D. today. An undue proportion of cases of gonorrhœa is found in recent immigrants to this country who seem to become infected most often after arrival. The control of venereal disease is an urgent social and medical problem. It is engaging the serious attention of medical, religious and social organisations, whose joint efforts are so important. Health education and propaganda by every available method, including broadcasting, is imperative.

FOOD INFECTIONS

Food infections (or, less accurately, "food poisoning") which were made notifiable in 1939, have shown appreciable increases in the post-war period (*fig.* 14). Whilst this may be the result, in part, of more careful investigation and improved facilities for bacteriological examination, it shows that the public are not yet fully

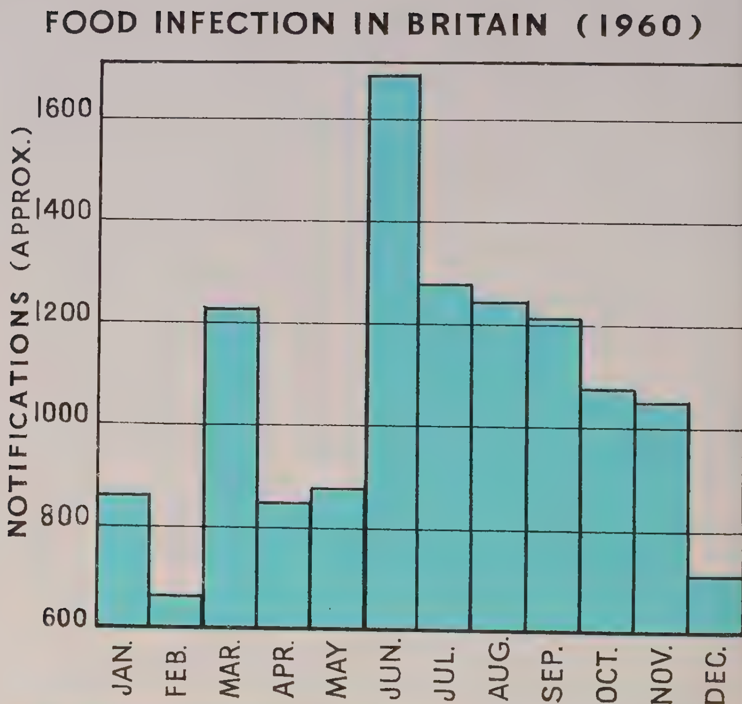

FOOD INFECTION IN BRITAIN (1960)
NOTIFICATIONS (APPROX.)
1600
1400
1200
1000
800
600
JAN.
FEB.
MAR.
APR.
MAY
JUN.
JUL.
AUG.
SEP.
OCT.
NOV.
DEC.

FIG. 14.

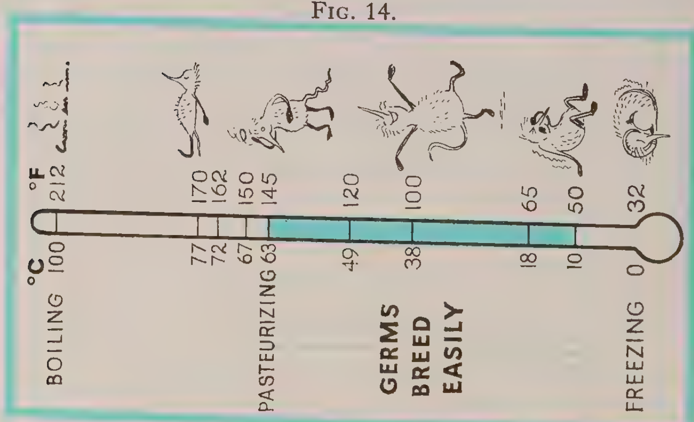

°F
212
170
162
150
145
120
100
65
50
32
°C
100
77
72
67
63
49
38
18
10
0
BOILING
PASTEURIZING
GERMS
BREED
EASILY
FREEZING

FIG. 15.

conscious of the risks of food contamination and the ways in which it can be prevented (*fig.* 15). The extension of communal feeding in works' and office canteens tends to spread infection among large numbers, but this should be offset by the steady improvement in the storage and preparation of food in shops and kitchens and the vigilance of local authority staffs who administer the new food hygiene regulations. Refrigeration, deep-freezing and hygienically prepared and pre-packed foods are new allies. A disregard of simple health rules in the home—hand-washing, kitchen cleanliness, protection against dust and flies, the use of the roller towel, and ignorance of the possible dangers arising from the consumption of made-up dishes unless eaten quickly or stored at low temperatures —will sooner or later give rise to food infection. The risks are greatest in summer.

It has been discovered that a certain proportion of pet foods, including horsemeat, contain food infection bacteria (salmonellæ). If carelessly handled they may easily cause human infection through the medium of hands, dishes and knives. Certain garden fertilisers frequently contain the same germs, and the same precautions apply.

DIPHTHERIA

Diphtheria is another disease which, although apparently conquered, still gives cause for anxiety occasionally. As recently as the period from 1933 to 1944, the average number of cases each year was 55,000. There were 2,800 deaths—for antitoxin must be given early to be effective. The graph shows the steady decline of the disease since 1942, which was brought about to a large extent by a campaign for massive immunisation against this highly infectious droplet infection (*fig.* 16). Social and sanitary betterment alone had not been enough, and although immunisation was available before 1939—it had almost eliminated the disease in Canada and the United States—the public took too little advantage of it. During the last year or so local outbreaks have begun to appear in communities in which the immunisation rates, including those of reinforcing injections, have fallen to a level which allows diphtheria to break through. Children in primary schools have been the chief sufferers, following the introduction of diphtheria by unimmunised children. These episodes show how readily the lessons of the past

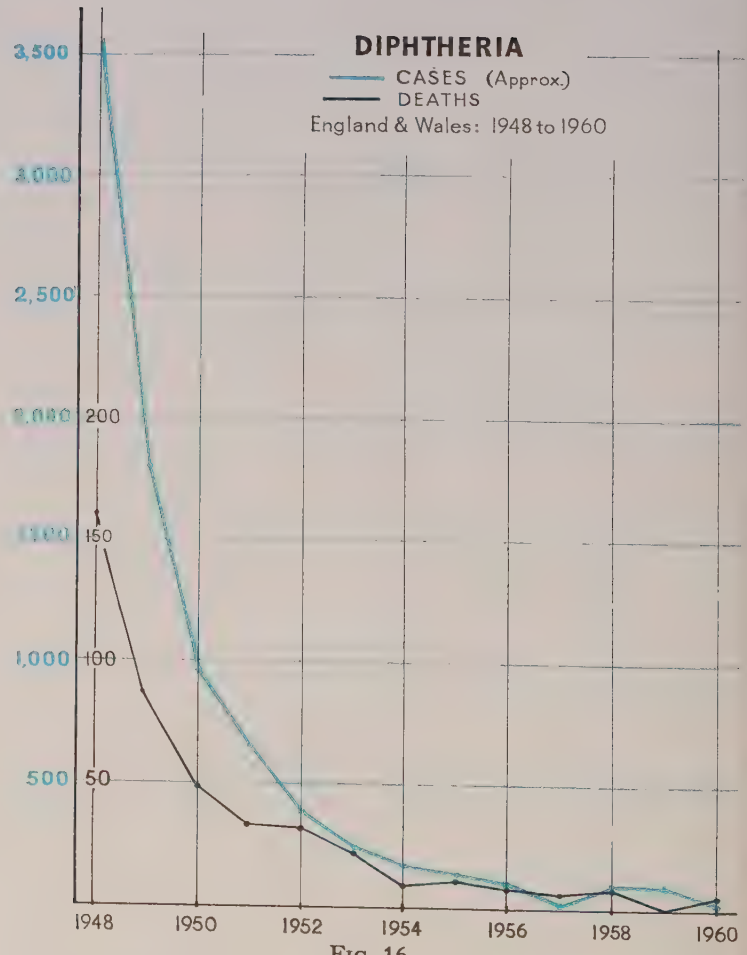


FIG. 16.

are forgotten. It is true, unfortunately, that for many people the appearance of a fatal ailment is still the only effective form of health propaganda.

BACILLARY DYSENTERY

The bacilli that cause the specific infection known as dysentery

are of three strains, two of which are not now common in Britain—which is fortunate, because they may cause serious disease. The third—known as **shigella sonne**—which predominates here, gives rise to a mild infection usually, with few deaths. Since 1940 both the incidence and number of deaths have risen. In 1960 the notifications numbered 43,000, and deaths 36. Children under 5 years and in early school life seem to be affected most often, and some recent outbreaks have been almost wholly confined to those in the second group. More cases now occur in the early months of the year than in the summer; they are often linked with a particular school. This change in the behaviour of sonne dysentery is notable. As a winter infection it cannot be fly borne: it can only be regarded as a contact disease indicative of poor hygiene habits. The organisms present in the fæces must be carried to the mouth by dirty hands and other objects—infected pencils, towels and so on. Carriers exist as well as patients to help in the spread.

Scrupulous hand washing after defæcation and before eating (clean nails are equally important), before preparing food, after attendance on a patient, and after washing nappies and underclothes, are sound preventive practices. Disposable paper towels, now quite cheap, must take the place of quickly-contaminated roller towels. Lavatory chain handles and door knobs may convey dysentery germs to the hands. The sulpha drugs are effective against dysentery; they may also be used to protect contacts.

MEASLES

Since measles became notifiable in 1940, an accurate record of its incidence has been available. The disease tends to diminish in prevalence in alternate years, and to attack children when they commence school and come into contact with others. The extent of present-day infection may be judged from the notification figures which reached 693,000 in 1955, 633,000 in 1957 and 539,000 in 1959. Happily, the number of deaths is now very much smaller than formerly: in 1960 there were two deaths for each 10,000 notifications, in 1941 the ratio was 28. Death is most likely in infants, who should be shielded from infection as much as possible; older children in the family suffering from measles should be isolated from them. In this complaint the patient is most infectious during the first four days of illness—before the rash appears.

Coughing and sneezing at this stage readily allow droplet infection of others to take place. Trials of a vaccine are encouraging.

RUBELLA

Rubella (German measles) is a non-notifiable virus illness which is usually mild. Since 1941 it has ceased to be unimportant. In that year cases of cataract were described, which were found in the children of mothers who contracted rubella in the early months of pregnancy. It is now known that there is a risk of one such child in three or four being born with defects of the eyes, heart, skeleton, or the digestive and nervous systems. During the first three or four months of pregnancy expectant mothers who have not had rubella, should avoid contact with a case. Convalescent serum may be given to such contacts.

STAPHYLOCOCCAL AND STREPTOCOCCAL INFECTIONS

These plentiful human parasites can cause many types of illness. A high proportion of people act as carriers.

STAPHYLOCOCCI

Staphylococci are the organisms found in boils, abscesses, "septic" cuts, wounds or burns, impetigo and eye complaints. They may cause pneumonia. They are the agents of cross-infection in hospitals. The toxins cause symptoms of food infection if the cocci are allowed to multiply, which they may do readily in meat dishes and those made from milk or milk products. Staphylococci make use of many routes in travelling from person to person. Unfortunately they are often resistant to the new drugs.

STREPTOCOCCI

Streptococci are of many varieties. They, also, may infect wounds, burns and scalds, and cause scarlet fever or tonsillitis, the skin diseases erysipelas and impetigo, and infection after childbirth. Big outbreaks of scarlet fever and tonsillitis have been due to infected milk from lesions on the udder of the cow. The "clean milk" campaign and pasteurization have made this a remote possibility today. As with staphylococcal infections prevention is based on the accepted principles of hygiene.

VIRUS DISEASES

Virus diseases caused by minute organisms (the smallest measure

less than 1/10,000 mm) are assuming more importance almost daily. Too tiny for optical microscopes, the viruses are revealed by electron microscopes, and now they can also be grown artificially. New viruses are being discovered from time to time, and virology has become an established branch of medicine. The times are comparable with those around the end of the nineteenth century when disease-causing bacteria were being identified, their life histories examined, and the science of bacteriology brought into being. Among the old diseases which were clearly infectious, but in which no specific bacteria could be discovered, were smallpox, chickenpox, measles, german measles, mumps, herpes, poliomyelitis, the common cold and influenza. These are known now to be virus infections. Numerous "new" diseases are being added to the list. They include affections of the throat and nose, usually mild and common in young people, virus pneumonia, encephalitis and meningitis, "epidemic diarrhœa" or "winter vomiting". Infective jaundice, the eye complaint trachoma, and cat scratch fever are other virus diseases. (See also *Plantar warts* page 55.)

POLIOMYELITIS

Poliomyelitis ("infantile paralysis", because once, it was confined to the very young almost exclusively) was first mentioned in 1784 by a London physician and recognised as a separate disease a few years later. But for a century only scattered cases appeared. In the early 1900s cases began to increase slowly: in 1918 there were 228 notifications in England and Wales, which grew to nearly 1,300 in 1920 and 1,600 in 1938. The character of poliomyelitis was changing—it was beginning to appear in epidemic form and older persons were being attacked. The first widespread epidemics occurred in 1949 and 1950, and the incidence remained high during subsequent years, with a peak of 6,300 cases in 1955. Deaths among young people were frequent. The numbers fell to 370 in 1960, but recently there have been sharp local outbreaks in Kingston-upon-Hull and other places. It is hoped that, thanks to the dramatic results of immunisation, this new parasite will have a short-lived existence as an enemy of man.

III. THE PRINCIPAL CAUSES OF ILLNESS AND DEATH TODAY

The infectious diseases are no longer among the major causes of

illness and death in this country. They have been replaced by non-communicable diseases and accidents. Diseases of the heart and circulatory system account for by far the highest proportion of deaths, followed by cancer and other malignant conditions, vascular lesions of the central nervous system and diseases of the respiratory system. One of the reasons for these changes is the increased proportion of older people in the community; other causes are believed to be linked with the changed pattern of existence in the modern world, with its mechanisation, speed and tension. But a great deal more needs to be learned before the causes are clearly defined. These matters are now receiving the greatest attention, as it is realised that preventive medicine has a large new territory to explore. Of the unduly prevalent ailments, chronic bronchitis, chronic rheumatism and peptic (gastric and duodenal) ulceration are of special significance, because they give rise to long periods of ill-health and disability, and absence from work. Mental illness, while not of itself more than a minor cause of death, is of vast medico-social importance. It is now being regarded in a new light in both its curative and preventive aspects.

Some of the principal diseases of today are discussed briefly below: for fuller information the reader is advised to consult some of the books referred to on page 148, or larger works.

DEATHS IN ENGLAND AND WALES IN 1955 AND 1960

The following details of the number of deaths in a year from some of the main causes, give an idea of their relative importance and present trends. More than two-thirds of the deaths were from diseases of the heart and circulatory system.

	1955	1960
Deaths from all causes	519,000	526,000
Coronary disease, angina	72,000	92,000
Cancer of lung, bronchus	17,000	22,000
Bronchitis	29,000	26,000
Tuberculosis, respiratory	6,000	3,000
Infectious diseases (less Syphilitic) ..	1,770	1,250
Accidents	16,200	17,700

(The numbers are approximate.)

It will be noticed that coronary disease and lung cancer have

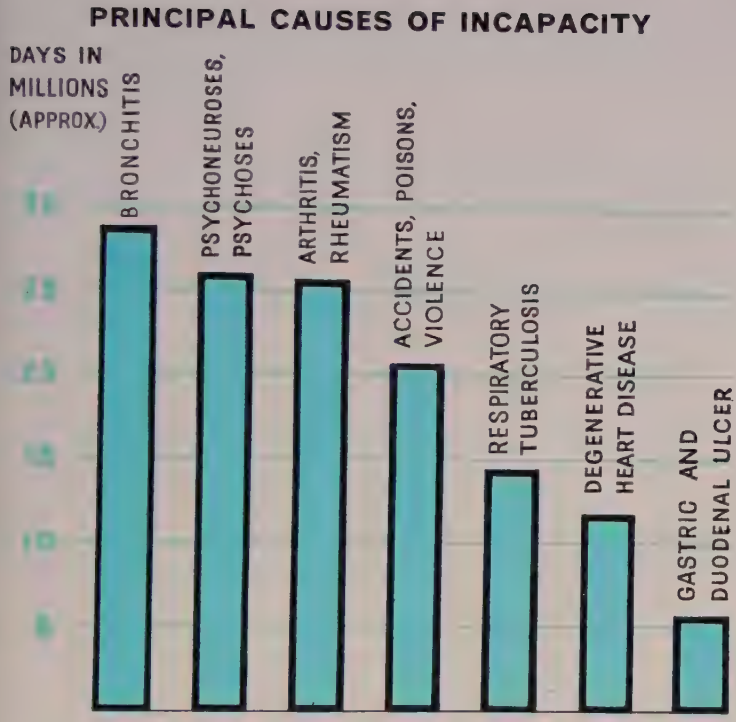


Fig. 17: Days of Incapacity. Year 1957-58

increased and that accident deaths outnumber those from tuberculosis and the other infectious diseases put together.

For many reasons **morbidity** records (those showing the amount of illness) are not so easy to obtain with accuracy. Information from various sources suggests, however, that, in the order given, the following diseases give rise to the greatest amount of illness in Britain in the 1960s. (*Mental illness is not included*):

1, Rheumatism; 2, Respiratory complaints such as bronchitis; 3, Digestive disturbances, including peptic ulcers; 4, Colds and Influenza; 5, Skin conditions, eye complaints, accidents, etc.

Incapacity due to certain illnesses and accidents in England and Wales in a year is shown on the diagram (*fig.* 17).

RHEUMATISM

Rheumatism has become a composite word used by most people to describe aches and pains almost anywhere in the body. Doctors recognise at least six separate diseases under this heading. Rheumatic fever was once a frequent and dangerous disease of childhood (with a marked preference for poor children), causing damage to the heart. It is encountered less often today, but it may still be dangerous. Deaths between 1951 and 1960 fell from 378 to 125. The chronic rheumatic diseases, rheumatoid- and osteo-arthritis, were once crippling complaints for which not much could be done. Those affected became housebound invalids only too often, resigned to their fate. The picture has changed with better diagnosis and treatment, including physiotherapy and after-care arrangements. If complete cure is not possible, great help can be given and major disablement prevented. The origins of rheumatoid arthritis are as yet obscure, but much more is known about fibrositis, which when it shows itself as backache is that annoying condition, lumbago. Injury, posture, infection, or wet clothes and draughts may precipitate an attack, and so may unaccustomed exercise—in older people in particular. It is one of the penalties of living in an age of mechanisation. The "slipped disc" is another popular disability, which, more often than not, is far less serious than it is made out to be, and like fibrositis responds well to treatment.

CORONARY THROMBOSIS

Coronary thrombosis, a degenerative heart complaint, now causes three times as many deaths as it did twenty years ago. In middle life, men—professional men and business executives suffer most—are more prone to die of it than women. In old age the sex differences are not marked. This disease is another legacy of civilisation; in the less developed territories it is not a major cause of death. Surveys and investigations have brought many facts to light, but much more has to be learned about its origins. It is thought that a high fat diet, heavy smoking, obesity, or sedentary work with too little exercise, predispose to its occurrence. (It is to be noted that manual workers are among the occupations least affected.) Whatever the reasons, good, healthy living with an avoidance of all excesses, should be the aim of everyone: when middle age is reached this is more important than ever.

CHRONIC BRONCHITIS

Chronic bronchitis can give rise to progressive disablement and inability to work. In this complaint, also, men suffer more than women. It is met with in industrial areas twice as often as in rural districts. Cold, damp, foggy climates are in its favour. Abroad, it is known as "the English disease"—a significant reminder that nowhere else but in Britain is its death-rate so high. Unlike coronary disease it falls most heavily on people living in unsuitable conditions and on manual workers, together with men working in the open in all weathers, and workers in certain dusty industries. Smoking not only aggravates bronchitis, it probably helps to bring it about in the first place. The effects of atmospheric pollution became evident when the London smogs of the last ten years killed so many old people suffering from bronchitis.

LUNG CANCER

This is one of the most serious health problems of the age. Already high five years ago, deaths from this cause are still mounting. Four persons die of bronchial cancer for each one killed on the roads. A great amount of evidence has been collected of which everyone should be aware, since it raises no doubt as to the close relationship between cigarette smoking and lung cancer. Recent figures show that for every 3 cancer deaths in non-smokers, there are 28 among pipe smokers and 78 among cigarette smokers. There is a close relationship between the number of cigarettes smoked and the death-rate. In people who smoke 10 cigarettes a day one death in 25 is from lung cancer, when 20 cigarettes are smoked there is one death in 8. A report by the Royal College of Physicians, London (1962), gives some further facts. Between the ages of 35 and 45 those who smoke a large number of cigarettes have a death-rate more than four times that of non-smokers. Men in this age group run a risk of 1 in 90 of dying if they do not smoke, if they are heavy smokers the risk is 1 in 23. People who give up smoking have a considerably better chance than those who continue. It is to be noted that as the number of women cigarette smokers increases, so does the cancer death-rate among them (*fig.* 19).

No effort should be spared to impress upon young people the dangers of smoking. They must be urged not to start smoking, or

Fig. 18.

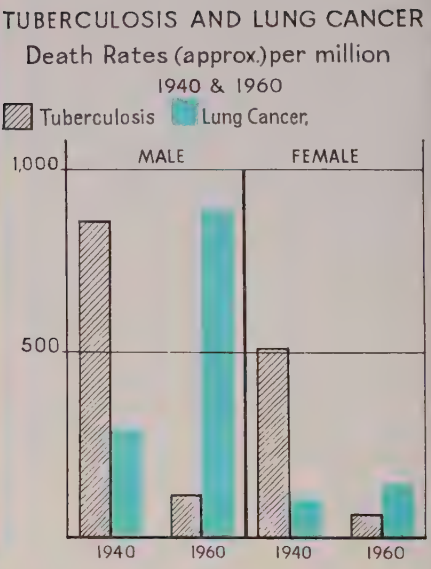


Fig. 19.

to give it up if they have begun. This advice from teachers, scoutmasters, youth leaders, doctors and parents is more likely to be heeded **when they set the example.** The increase in cigarette smoking among young school children of both sexes is alarming. Clever advertising of cigarettes on television and elsewhere is an added suggestion to boys and girls who want to smoke in order to show that they are grown up. Frank discussion in the home on this as on other problems of personal health, is one of the best ways of counteracting the wrong sort of propaganda.

Atmospheric pollution is also believed to add to the risks of lung cancer, and it is true that in London and the large towns where pollution has been greatest, more cases occur. But so far the evidence is not as conclusive as it is against tobacco. It is likely that both these agents play a part. Exhaust fumes from motor car and diesel engines contain a chemical which can cause cancer experimentally, but there is little evidence that it adds to the cancer risks of town dwellers. (London policemen and bus drivers do not show a higher-than-average incidence.)

ULCERS OF THE STOMACH AND DUODENUM

Ulcers of the stomach and duodenum cause relatively few deaths (4,700 in 1960) but much recurring ill-health, anxiety and misery. These conditions prove very expensive in loss of working hours, drugs and medical treatment. Their incidence has increased, with male patients predominating, but recent enquiry suggests that cases of duodenal ulcer may be getting less. Irregular, unsuitable meals, alcohol and tobacco, aggravate digestive complaints; so do anxiety and worry, often related to difficulty in coping with the job, or finding a new one. There may be an emotional background (duodenal ulceration is classed as a psychosomatic disease—see below) but cause and effect are not easily separated. Most people can live a contented and normal life if they make up their minds to come to terms with their disability, and learn to live with it. The doctor's advice should be the guide.

MENTAL ILLNESS

Mental illness and mental deficiency (called "mental subnormality" under the Mental Health Act 1959) have always presented very big problems. They account for about half of all patients in hospital—153,000 with mental illness and 59,000 with mental subnormality at the present time. It is commonly thought that such illnesses are increasing, due mainly to the increased stress of modern life, but there is no convincing evidence that this is so; in fact it is probable that the major psychoses, **schizophrenia** and **depression,** occur no more and no less often than they did 100 years ago. What is certain is that people come forward for treatment much more readily now and that admissions to mental hospitals become higher and higher year by year. Fortunately new techniques are leading to even more discharges than admissions so that we are seeing a steady reduction in the numbers of patients in such hospitals and the Ministry of Health believes that it will be able to close many hospitals in years to come. Many troubled people, of course, never need hospital admission and the family doctor may find psychiatric trouble—anxiety mainly—in as many as one in every five patients.

Though the numbers of the mentally ill have probably changed little, the pattern of many disorders has changed greatly. Thus psychosis due to syphilis of the brain (dementia paralytica) has all but disappeared following the use of penicillin and mass publicity—

it is a disease which can be prevented absolutely by effective treatment of syphilis in the early stages. Psychosis due to vitamin deficiency (mainly pellagra) has likewise vanished; and better care at childbirth and more effective treatment of infections of the brain have both made permanent brain damage less likely. Hysterical conditions in women have become greatly reduced over the last half century—due doubtless to cultural changes—but there is the suggestion that other neurotic disorders and conditions in which emotional factors play a part such as asthma, peptic ulcer, and some skin conditions, may have become more common. Psychiatric illness in the elderly, corresponding to the larger numbers of people surviving to old age, is a much bigger problem and will continue to increase for some time to come. There is no suggestion that mental subnormality is increasing—if anything slightly the reverse, but the possibility of the harmful effects due to increased radiation will have to be closely watched, for it is on the developing germ cell that the effects are most pernicious. The study of mental illness in the systematic way which has yielded such remarkable progress with infectious disease has hardly begun. The field of psychiatric epidemiology is expanding rapidly and much new knowledge is being gained.

If the illnesses themselves have changed little, the attitude of the public (and of the medical profession) towards them have been transformed over the past century although, it must be admitted, psychiatric services are still the poor cousins of medical and surgical services. One hundred and fifty years ago the lunatic was an object of ridicule and abuse, locked away in a madhouse or chained in a cellar of the home. "Treatment" was usually punitive and often excessively cruel. The reforms brought about by some mental hospital doctors of vision at home and abroad led to a wave of reform in which chains were cast off and patients treated humanely—some hospitals even opened the locked wards. Unfortunately the latter part of the century saw a reaction from this phase of enlightenment; asylum building tended towards larger and larger hospitals, set deep in the country with security as the main concern. Fears of wrongful detention led to a complex system of certification which effectively prevented early cases from receiving treatment. The Act of 1930 marked the turn of the tide, and for the first time since 1890 patients were allowed to enter mental

hospitals of their own free will and retain their freedom to leave if they so wished. Progress since has been rapid: old hospitals have been altered and redecorated; occupational therapy is now universal—factory units, group methods and rehabilitation schemes of all kinds abound and most of the wards are unlocked—a number of hospitals in this country indeed have no locked doors anywhere. Combined with new drugs and physical treatments it is fair to say that the mental hospital scene has been thus transformed as dramatically as anything in the history of medicine, and that this aspect of our medical service will more than stand comparison with anything in the world.

Such active techniques have led to a better outlook—the majority of patients are discharged from hospital within a year—but there remains a tendency towards relapse and the emphasis is now being put on **community psychiatry.** Treatment can be carried out in the home, as an outpatient, or in day hospitals, to which the patient comes for treatment between 9 and 5. Halfway houses are being provided for those who are not quite ready for full discharge and factory units are being set up to offer sheltered occupation to vulnerable people. Admission, where required, will in the future be to a small acute psychiatric unit which will be part of the general hospital, near to the patients' home. The meshwork of the mental services will, in the future, trap a greater number of antisocial people, known as **psychopathic personalities,** hitherto dealt with by the penal services. The possibility of detaining such people for medical treatment in special units to be set up by the Ministry of Health constitutes the most revolutionary change of the 1959 Mental Health Act. Others are that patients may be admitted "informally", just like any other patient, for psychiatric treatment to any hospital willing to give it and that compulsory detention, when rarely needed, no longer requires the authority of a magistrate.

Psychiatrists, family doctors, public health doctors and their staffs and many others are now working jointly in the service of the mentally ill. They are learning a great deal about the background of mental illness and the causes of breakdown. Departures from the normal which present themselves as juvenile delinquency or other behaviour problems, or emotional and physical disturbances, or as a neurosis, are often attempts to adjust to an unsatisfactory

environment. The quality of home life is the key to the future of the growing child, who, more than anything, wants affection, consistency of discipline, security and shielding from emotional disturbances. The child needs help in order to face the stresses and strains of life. Later, when there is emergence into adolescence and independence, encouragement and wise removal of restrictions are essential. In the more serious mental illnesses as well, an adverse environment is among the exciting causes, and when counteracted can relieve symptoms and remove a potent cause of breakdown after treatment.

PSYCHOSOMATIC ILLNESS

Psychosomatic illness is a term which is used frequently today. It was brought into use to emphasise the close ties between mind and body. It is well known that physical illness and what goes with it can have deep effects on the mental state. Serious illness which entails a long stay in hospital, or one that leaves a permanent disability; anxieties about the family; worries about loss of income or finding new employment; doubts about compensation after an accident; all these may give rise to considerable mental disturbance. On the other hand, emotion, fear, anxiety, may precipitate an illness—many believe that emotion can be a factor in the onset of tuberculosis. Among the ailments which can sometimes be placed in the category of "psychosomatic" are duodenal ulcer, asthma, certain intestinal disturbances, skin conditions and "blood pressure". (See also *Social aspects of illness*, Chapter IV.)

WORLD HEALTH

Communicable diseases and nutritional defects are still rife in many parts of the world. The less developed countries suffer most. In tropical and sub-tropical regions insects are dangerous enemies of man. The mosquito heads the list; the fly is not far behind. In both hot and temperate climates where sanitation is primitive and health habits poor, excremental and other diseases flourish. **Malaria,** "the world's most costly disease", is always a threat to 1,000 million people. The intensive work of the World Health Organisation in 92 countries is showing results, in some of these the disease has been almost completely eradicated. **Smallpox** is always ready to strike when the vaccination rate gets low, and at present there are outbreaks in several countries. Infection reaches

Britain from time to time, the risks being enhanced with the advent of swift air travel. The lengthy sea voyages had the advantage of taking longer than the incubation period. **Cholera,** which vanished from England 60 years ago, has been epidemic in eastern countries quite recently. **Tuberculosis** is a big problem in many parts of the world. Where the native population has not yet achieved a high degree of immunity on account of little contact with the town dwellers of the outside world, and where case-finding has not been intensified nor B.C.G. vaccination made available, control is difficult. A lack of adequate medical services, together with sub-standard living conditions hamper preventive effort. The **typhoid group** of infections and other excremental diseases are conspicuous where food and drink are easily polluted and flies are numerous, as visitors to such places in Europe and elsewhere can testify.

ILLNESS CAUSED BY PARASITIC WORMS

Bilharzia has been present in Egypt for thousands of years. It is widespread in many countries of Africa, South America and the East. Some 60 per cent of the population may be infested. This complaint causes a vast amount of ill-health, and its control is an urgent matter. Animals may act as reservoirs. After the eggs have been passed in urine or fæces, a fresh-water snail is used as an intermediate host. Pure water supplies and sanitation are the keynotes of prevention. **Hookworm,** a disease causing anæmia, affects thousands of people and is a source of much illness in many tropical lands. The larvæ of the small worm which lives in the duodenum, are found in water and damp earth. They penetrate the skin and find their way to the gut, from which eggs are passed in the excrement. Water is infested, and the life cycle is completed. At one time Cornish tin miners suffered from this complaint. Many other worms cause widespread infestation in less developed countries.

INTERNATIONAL CONTROL

Vigilance at the ports, established some centuries ago to prevent the entry of plague and cholera, and the operation by most countries of international sanitary regulations, have acted as barriers to the spread of infection from country to country. Special regulations are applicable to aircraft. Prompt information is furnished by W.H.O. about the localities in which the major infectious diseases are present.

CHAPTER XII

HOME ACCIDENTS

Home accident deaths are increasing; they outnumber those on the roads. In 1960, there were 55 accidental deaths each day in England and Wales, of which 19 were associated with road or other forms of transport, five occurred in industry, and 31 as a result of injury in or about the home. Four out of every five home accident deaths were in children and old people. That accidents are of very real concern today may also be judged from the fact that they kill three times as many children as the infectious diseases. Falls, poisoning, burns and scalds, and suffocation are the most frequent of the causes. The number of non-fatal accidents is not known, but local investigations have shown that it may be as high as 30 in each 1,000 of the population. They are responsible for much disfigurement and disablement and long stay in hospital. The less serious accidents happen most often to people between 20 and 60; in housewives—who head the list—they are a definite occupational hazard, but like all such risks, there are many ways of reducing them to a minimum. The discovery and correction of contributory influences are of even greater significance in forestalling the more serious accidents which are apt to follow the minor ones.

Some individuals are said to be "accident prone", which in the absence of some disability, is another way of saying that they are careless, untidy, fatigued, or too hurried in their actions. Not only do they cause accidents to themselves, but to those around them, predominantly to children. There are, of course, many material factors in the home, such as bad planning and structural defects which have an important bearing on the accident rate; in combination with accident-proneness they are of special significance.

NATURE AND PREVENTION OF ACCIDENTS

It has been shown that by far the greatest impact of accident fatalities is on those at the extremes of age. Deaths from falls make up half the total—on the stairs, out of bed, from ladders, on

slippery floors: accidental poisoning by coal gas and solid and liquid substances, and burns, account for a quarter of the deaths. In one year clothing catching fire killed 317, falls into an unguarded fire, 72. The 900 deaths from coal gas were almost entirely confined to the aged, who tend to lose their sense of smell with advancing years; children suffered heavily from swallowing medicines and corrosive liquids left within their reach. The less severe injuries of the middle age-groups were cuts from knives, wood-chopping or tin-opening; falls over obstacles or from chairs and ladders; and crushed hands trapped in windows with broken cords. The kitchen is a focal point of accidents, notably when it is too small, badly equipped and arranged: it is also the place where another "accident", food poisoning, has its beginnings (*figs.* 20-27).

It is tragic that the saving of young lives through the control of infectious diseases should be counterbalanced by the heavy toll which accidents now take. This is demonstrated in the table:

Deaths during 1960

Tuberculosis ..	3,430	Diphtheria	5
Gastro-enteritis ..	867	Typhoid	3
Poliomyelitis.. ..	46	Scarlet Fever ..	0
Measles	31	Motor Vehicle Accidents	6,643
Dysentery	36	All other accidents .. (85 per cent at home)	11,077
Whooping Cough ..	37		

RULES FOR ACCIDENT PREVENTION

Study the posters and pamphlets available and seek further information from the Town Hall.

Practise order and method in the home; *don't* leave toys, mops and pails lying about on the stairs or on the floor. Lock-up poisons and medicines in a special cupboard; see that they are properly labelled; *don't* use them in the dark. Buy non-inflammable clothing. See that fire-guards are in position and properly fixed. Beware of amateur electrical repairs, loops of flex across the floor, electric fires, radio sets in the bathroom. Turn saucepan handles inwards. *Don't* use a dangling tablecloth which can be pulled by a child.

DEATH TRAPS IN THE HOME: *Burns*

FIGS. 20 (*right*) AND 21

NINE OUT OF TEN BURNING ACCIDENTS FROM COAL, GAS OR ELECTRIC FIRES HAPPEN WHEN NO GUARD IS IN USE. GUARDS MUST BE *FIXED*, OF FINE MESH AND NOT SO CLOSE THAT THE WIRE GETS REALLY HOT

DEATH TRAPS IN THE HOME: *Poison*

FIGS. 22 (*above*) AND 23

KEEP DANGEROUS DRUGS, SLEEPING TABLETS, POISONS AND DISINFECTANTS LOCKED UP, WELL OUT OF THE REACH OF SMALL CHILDREN

DEATH TRAPS IN THE HOME: *Scalds*

FIGS. 24 (*top*), 25 (*lower left*) AND 26

KEEP SAUCEPAN HANDLES AND KETTLE SPOUTS AWAY FROM SMALL HANDS. TABLECLOTHS SHOULD NOT OVERHANG TABLE EDGES

Examine gas appliances for defects: call in the gas officials for advice. *Don't* let children play with plastic bags.

Give attention to loose stair carpets, broken steps, defective ladders, window cords and floor boards. Do away with polished floors, and mats that slip over them. Repair defective yard paving.

Get rid of unnecessary furniture; improve natural and artificial lighting of passages and staircases.

Give special attention to the accommodation of old people, which is best at ground level. A rail at each side of the staircase if an upper floor is occupied is a great help, so are hand rails above the bath and a rubber mat in it. The gas meter placed high on the wall invites a fall from a chair. If a gas stove is used it must be provided with special safety taps.

Put the cold water in baby's bath first, and then add the hot; test with the elbow. *Don't* leave the bath unattended on the floor. Protect bedroom windows, place a gate at the top of the stairs. Watch the spaces between the cot rails (not more than three inches apart). Use a hard pillow, or no pillow at all. Purchase toys from a reputable firm. *Don't* leave baby alone with a feeding bottle.

This is merely a selection; many other, and equally obvious, rules will occur to the reader (*fig.* 27).

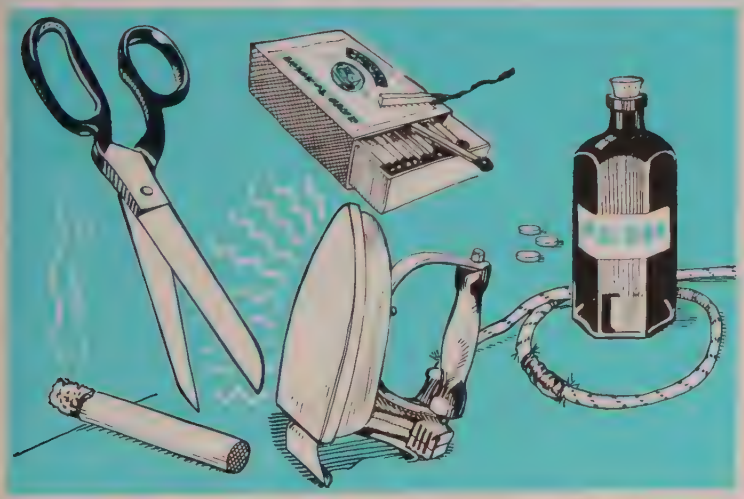


FIG. 27: KILLERS. KEEP THESE IN A SAFE PLACE

CHAPTER XIII

HOUSING

In the introductory chapter attention was drawn to the association of environment and health: shelter—or as it is now called, housing—was included among the environmental influences. It is a major one.

HISTORICAL

At an early stage in civilisation man found shelter against the elements in caves and crude huts. In due course more substantial buildings of wood, mud, stone and brick were erected. It was when dwellings became aggregated into settlements, for safety or for trade, and community life began that housing became of public health importance. Where houses were built within the walls of a fortified place, restriction of space made it impossible to prevent congestion: elsewhere, lack of planning and sanitation favoured the diffusion of infection at a time when knowledge of health matters was of a low order. Even in Rome with its fine houses (including apartment houses for the workers) the city grew in a haphazard fashion, and as happened in many other cities in later centuries, subsequent attempts at planning proved difficult. Town-planning of a sort was put into operation in some ancient towns, but it was not until 1909 that it really began in England.

In the middle ages British towns were closely built and insanitary, having dark, narrow streets and courts, with no semblance of the municipal cleanliness known today. In the country most of the people lived in wattle and daub huts with earthen floors, some of which were still in occupation up to the 18th century and later. The Fire of London in 1666, which provided terminal disinfection and disinfestation after the plague, gave wonderful opportunities for planned reconstruction, but it was only carried out to a limited extent. London replenished its human stocks from the countryside, and outside the city there sprung up "sheds, hovels and gypsy

tents, from Smithfield to Highgate", where people lived under dreadful conditions.

The London of Charles II was dirty and unhealthy, the streets deep in the filth of domestic refuse, the gutters overflowing with foul water. The rivers that emptied into the Thames—the river Fleet was just an open sewer—and the Thames itself were grossly contaminated, and so were the shallow wells that provided domestic water. Little sanitary advance was made for 200 years. As late as 1850 untreated Thames water was being piped to houses, with little awareness of the danger and the link with typhoid and cholera.

The Industrial Revolution (1760-1840) changed England from an agricultural to a manufacturing country. People flocked to towns which expanded rapidly around the factories, to live in streets of jerry-built houses, many of them back-to-back, with a common privy and an ashpit at the end of the row. So the slums were born. Housing reform took a long time to begin and it was not until the passing of the public health and housing acts in the middle third of the last century, that any firm attempt was made to grapple with the problem. The "sanitary idea", pursued with such vigour by Edwin Chadwick and others at that time, was the first big step in the march of progress.

HOUSING AND HEALTH

That there is a close link between bad housing and poor health has long been recognised, but the exact relationship is not easy to set out in so many words. If, on the other hand, "housing" is given a wider meaning, to embrace general home conditions, the ages and occupations of the occupants, overcrowding, garden space, surroundings, the character of the neighbourhood and so on, it is possible to be more explicit. But even then such variables as income, rental, habits and the level of health-consciousness have to be taken into account. It is the bad, overcrowded house in which—irrespective of income, but dependent on habits—bacillary dysentery, food poisoning, tuberculosis and other infections are most liable to spread. Other things being equal, the badly planned and structurally defective house is the one in which accidents are most likely.

A damp house is obviously not a healthy one, especially for those who have chest complaints and for the sick and frail generally.

"Rheumatism"—rheumatic fever and rheumatoid arthritis—does not appear to have a close association with housing, but getting wet, sleeping in a damp bed or sitting in a draught can bring on an attack of fibrositis. Old houses can be difficult to ventilate properly without becoming draughty; inexpert draught prevention measures often make adequate ventilation impossible. A well ventilated sleeping or day room minimises the dangers of infection. Heating and lighting, which are important features of a healthy house, will be discussed later.

A home which is badly designed, in poor repair, or too small for the number of its occupants, gives the housewife added work, often causing undue fatigue and frustration. It is hard to keep clean and tidy; cooking and food storage are difficult; cleanliness of the person presents problems in the house without a bath; washing and drying of clothes is no easy matter. The aged and disabled living on upper floors cannot readily get to an outside lavatory or coal house. (It is not unusual for old people to become housebound unnecessarily because they cannot negotiate the stairs.)

Anxiety states precipitated by housing worries are not uncommon, more especially in houses in multiple occupation. Friction between families having to share kitchens and sanitary facilities is hard to avoid; it can happen when the young married couple, anxious for a home of their own, live with the "in-laws", or when people of different races and habits live under the same roof.

To be houseproud is a foundation of happy family life, and happiness and health are allies. The crowded house has no privacy —no quiet place for the children to do their homework, nowhere where friends can be entertained or hobbies pursued. Homes without such amenities are those in which problem families are most likely to come into being and child delinquency to be fostered.

Despite all that has been said, it is as well to bear in mind that as long as the housing shortage exists, large numbers of families must continue to occupy sub-standard accommodation. Most of them are able to offset these disadvantages by the will and determination to make the best of matters until they are rehoused. Housing defects should not be made an excuse for indifferent personal hygiene, difficult though it is to embrace it when facilities are wanting. But a move to a housing estate does not always solve

all the problems, Already there is talk of "suburban neuroses" occurring in some of the rehoused who miss the haunts they knew and complain of loneliness and social isolation. They are best found homes in blocks of flats near their previous abodes. Others find the lack of privacy irritating. These two types are, nevertheless, exceptional; the majority soon settle down, benefiting from the opportunities of once more living a happy family and community life in salubrious surroundings and of being able to use their leisure properly.

HOUSING CONSTRUCTION

The last few years have witnessed many changes in the design and construction of houses and flats and in the materials available. Multi-story blocks of flats are replacing the old terrace houses, and housing estates and new towns have sprung up. The progress made in the design of houses is but the beginning: there is little doubt that the houses of tomorrow will be still better adapted to meet the needs of modern life.

The Public Health Acts empower local authorities to make building byelaws which deal with house construction and drainage. Plans are submitted to the local authority for approval. The Housing Acts confer powers in respect of repair, demolition and closure of any insanitary house. Every planning authority must carry out a housing survey and prepare a development plan.

SITE AND ASPECT

A dry, porous soil such as sand, gravel or chalk is better than clay. Made-up land has many disadvantages; before being built on it needs draining and concreting. An elevated and gently sloping site with a southerly aspect and not too close to high buildings and trees is ideal. These are counsels of perfection, which can be put into practice in only a minority of cases.

CONSTRUCTION

A house must be strong, free from damp, insulated against sound and loss of heat, and protected against vermin. Modern building methods help to achieve these ends and to reduce fire risks.

Dampness rising from the ground—because bricks are porous—is stopped by the insertion of damp-courses of slate, lead or

bitumen in the lower parts of walls*. Defective chimneys and roofs and the walls themselves may allow rain to penetrate. Condensation of water vapour on cold surfaces, often a nuisance, is overcome by efficient ventilation and heating and by an absorbent wall surface. The space between the flooring and the ground must be ventilated by means of air bricks, otherwise dry rot, due to a fungus which flourishes in damp wood, is liable to occur. Creosote preserves wood and painting helps to prevent beetles from boring into it.

Floors, in order to be waterproof, are made of tongued and grooved, well-seasoned wood or wood blocks: synthetic flooring materials are available which are very effective. Wooden skirting boards and picture rails are undesirable. Each habitable room must have at least one window opening to the outside, with a total window area of not less than one-tenth of the floor space. Drainage plans must be approved; all waste pipes leading to a drain must be trapped. When service pipes are placed on inside walls the risks from frost are diminished.

PLANNING A HOUSE

In addition to being dry and in a good state of repair, it is generally agreed that there are certain standards of fitness for dwelling houses which should be adopted. These relate to:

(a) natural and artificial lighting and ventilation;
(b) water supply, including a hot water system;
(c) W.C.s and bathrooms;
(d) sinks and arrangements for waste water disposal;
(e) heating of all habitable rooms;
(f) preparation, cooking and storing food;
(g) storage of fuel;
(h) access to the back door.

The appearance of the house, garage space, pram shelter, and storage space for smokeless fuel are further points of importance today. Modern ideas on internal layout and room fittings to simplify the running of the house are being put into practice, but

*Success is claimed for a new method of damp-proofing which adds to the life of old buildings. A mixture of latex and silicones, injected through holes, forms a waterproof barrier which is said to prevent moisture rising from the ground.

building costs have to be taken into consideration. Accident prevention is now accepted as an inherent principle.

LAVATORIES AND BATHROOMS

The W.C. and bathroom should be separate. A washhand basin in or near the W.C. is essential. A W.C. must not communicate directly with a living room or kitchen, it should open on to a passage way preferably with an intervening lobby; if not ventilated by an outside window there should be a suitable extractor system. Ideally bathrooms should have shower-bath fittings, heated towel rails and points for electric razors. Provision for washing and drip-drying is now an added advantage.

KITCHEN HYGIENE

A well arranged kitchen of a convenient size with appropriate fittings and good natural lighting reduces work and promotes hygiene. The sink, if of a height suitable to the stature of the housewife prevents undue fatigue: between 34 to 36 inches from the floor to the top of the sink is an average height. A drainage board on each side, a plate rack above and a quickly available supply of hot water allow dishes and utensils to be properly cleansed. The use of detergent solutions should be followed by thorough rinsing—for which a second sink is needed, especially in large establishments and in canteens and restaurants—and air drying. Drying cloths rapidly become contaminated with bacteria, and so do the old-fashioned types of roller towels, which are best replaced by paper towels for drying the hands.

Ideally the equipment of a kitchen should consist of a sink-unit, refrigerator, washing machine and spin dryer, together with built-in cupboards. A larder, should face north, be well ventilated, with an outside fly-proofed window, and a suitable shelf of slate or other impervious material.

OVERCROWDING

The danger to the health of people who live in crowded conditions has been recognised for a long time, and measures to prevent it have been laid down in many Acts of Parliament. There are standards for canal boats, merchant shipping, common lodging houses and dwelling houses. The Services have similar regulations

for barrack accommodation. Crowding in offices, factories and schools is equally liable to promote the spread of droplet infections.

The Housing Acts specify "the permitted number" of persons according to the size and number of rooms. Children below one year are not taken into account, those between 1 and 10 years count as half—a method of assessment open to criticism. Permitted numbers are obtained from the following tables:

I		II	
One room ..	2 persons	110 sq. ft. ..	2 persons
Two rooms ..	3 ,,	90-110 sq. ft. ..	$1\frac{1}{2}$,,
Three rooms ..	5 ,,	70-90 sq. ft. ..	1 person
Four rooms ..	$7\frac{1}{2}$,,	50-70 sq. ft. ..	$\frac{1}{2}$,,
Five rooms ..	10 ,,	Under 50 sq. ft.	Nil

Under the Factories Act, every person in a room must be allowed 400 cubic feet of space; in a bakehouse, 500 cubic feet. In canal boats the requirements are: under 12 years 40 cu. ft., over 12, 60 cu. ft., at least.

CHAPTER XIV

HEATING, VENTILATION, LIGHTING, SUNLIGHT

HEATING

In the preceding chapter the heating of all habitable rooms was given as one of the requisites of a proper dwelling. Rooms that cannot be heated are not used in the cold weather; it follows that the family crowd into one room, so, reducing useful house space. Dampness, condensation and ventilation are related to the heating system. Domestic heating is a technical matter, but it is as well to understand the principles on which it is based.

Heat is distributed by conduction, radiation or convection. The metal of stoves and hot pipes conducts heat to the air in contact with it, and convection currents are set up which disperse the heat. In most domestic systems heating is by radiation and convection. Heat is radiated by waves which pass from a body which is warm to another which is cooler. (The sun warms the earth in this way.) The intervening air, if dry, absorbs little of this heat. A source of radiant heat is usually visible as in the glow of a coal, gas or electric fire. When air is warmed it becomes less dense and rises, cooler air taking its place. This is the principle on which heating by convection, and natural ventilation depend. Stoves, hot water or steam pipes and "radiators" (wrongly named), are convection heaters, because they warm the air around them. They take a little time to heat a room and may not be suitable for rooms only occupied for short periods.

The temperature of a living room or office should be about 65°F. (18.5°C.). Space-heating is useful for keeping the whole house at a temperature of about 55°F. (13°C.); individual rooms may then be raised to 65°F. by radiant heat fires of smokeless fuel, gas or electricity.

VENTILATION

Many references to ventilation have already been made. Its purpose is to change the air in houses and other occupied buildings

as often as necessary without producing a draught. Movement of air over the earth, which makes winds and brings rain, is a natural phenomenon on which human life depends. It is equally necessary to prevent the stagnation of air indoors, which may be polluted from combustion and respiration, and be heavily charged with water vapour as well as droplets carrying organisms which cause disease. The frequency with which the air in a room needs to be changed depends on its size and the number and physical activities of the occupants. An average room with 4 occupants needs about $1\frac{1}{2}$ changes per hour.

THE COMPOSITION OF AIR

Air is a mixture of gases with an average composition of 78 per cent nitrogen, 21 per cent oxygen and 0.04 per cent carbon dioxide. Pollution from combustion, decomposition and industrial processes which adds other gases which are poisonous is discussed in the section on Clean Air. Air expired from the lungs contains 16 per cent oxygen and 4 per cent carbon dioxide, but the last-named gas can rarely reach a concentration which is poisonous. The warmer the air the greater the amount of water vapour it can take up. After a time it becomes saturated. This is the situation in a hot unventilated room with many people in it: discomfort arises as the ability to lose heat is impaired.

NATURAL AND ARTIFICIAL VENTILATION

In this country reliance is placed on **natural ventilation,** which depends on winds and convection currents, and openings provided by windows, chimneys, air bricks, and roof or wall ventilators. A difference of 10°F. between the inside and outside temperatures gives a good exchange of air. A room without a fireplace needs extra air outlets. Depending on conditions, 600 to 1,000 cu. ft. of fresh air per person per hour, should be sufficient, as indicated by the absence of body odours. Air movement above 2 ft. per sec. gives a draught. **Artificial ventilation** depends on mechanical methods of propulsion or extraction. Fans are employed in conjunction with a system of ducts communicating with the rooms. Air conditioning allows of the air being filtered, heated, cooled or humidified according to requirements and climatic conditions.

Mechanical ventilation systems unless scientifically designed and expertly controlled are liable to ventilate poorly or unevenly.

LIGHTING—NATURAL AND ARTIFICIAL

SUNLIGHT

The rooms in a house should receive as much natural light as possible. It has been shown already that the amount is determined by the position and aspect of a house, the proximity of tall buildings, the size and situation of windows and the presence of smoke or smog in the atmosphere.

The amount of natural light at a point indoors is calculated as a percentage of that in the open air under an unobscured sky: it is known as the **daylight factor.**

The ultra-violet rays from the sun, as opposed to the heat rays, do not penetrate ordinary glass. They cause pigmentation of the skin, but if exposure is too long or too intense there is an irritating first stage of redness, blistering and a rise of temperature which causes restlessness, sleeplessness or even more serious symptoms. The eyes are most sensitive to the rays. Sun tan is always best acquired slowly and cautiously. Children and persons with sensitive skins should take even greater care. For adults about ten minutes exposure of the body is quite enough on the first day; this may be increased to 20-30 minutes on the second, 40-60 minutes on the third, and so on, if there is no discomfort. Since infra-red rays are received at the same time, the body may become overheated, which is a reason why sunbathing is best enjoyed in the early morning, when infra-red rays reaching the earth are limited.

Ultra-violet rays from the sun are necessary for life. In the presence of the green colouring matter of plants—chlorophyl—they are responsible for the manufacture of carbohydrates from water and carbon dioxide. Vitamin D is produced in certain foods as a result of ultra-violet radiation, which was at one time used extensively for the prevention and treatment of rickets in children. The rays were produced artificially by mercury vapour or carbon arc lamps in special clinics. With an adequate vitamin intake, rickets has become rare, and these clinics have gone out of favour. On the other hand great success attended expert treatment of tuberculosis of the skin, bones and joints by these methods, and under-nourished children greatly benefited from a sojourn in

hospitals in which helio-therapy (as sun treatment is called) was combined with good food and pure air in pleasant surroundings. Sun bathing is definitely harmful to persons with tuberculosis of the lungs.

The cult of sun-bathing has spread since the war and there is no doubt that practised properly it is a healthy one. The psychological value of a bright sunny day is well known—a tanned skin gives a healthy look, and to look well is to feel well. On the physical side there is the powerful disinfectant action exerted by ultra-violet light on the air, water, dust and clothing. Sunshine encourages activities in the open air and helps to dissipate infection. In association with sea bathing its stimulating effect on the skin is enhanced, and the tendency to overheat the body is minimised. To sum up, although ultra-violet light has probably no specific "tonic" action on the body and does not directly raise resistance to infection, its psychological effects are considerable: the physical ones are linked with exercise in the open with the minimum of clothing, body cleanliness, the destructive action on bacteria, and its ability to form vitamin D in the body. There is more to be learned of its rôle in the promotion of health.

ARTIFICIAL LIGHTING

Artificial lighting must be adequate for individual needs in the home, school or workshop. Good lighting does not give a glare nor cast shadows; it does not flicker nor produce marked contrasts of light and shade. Electricity has now become the chief source of artificial illumination, it has the further advantage of not producing any products of combustion to vitiate the air of a room. Fluorescent light can approximate to natural light, with less generation of heat than from ordinary electric bulbs. Good lighting, conforming with these accepted standards, reduces eye-strain and undue fatigue, at the same time raising working efficiency. Accidents are far less likely when staircases and passages are well lit, they are also more easily kept clean.

CHAPTER XV

ENVIRONMENTAL HYGIENE AND SANITATION

DISPOSAL OF WASTE PRODUCTS

REFUSE

Each household produces something like 2½ cubic feet (30 lb. weight) of refuse every week; in a town of 100,000 population upwards of 500 tons are collected weekly. The collection and disposal of refuse is obviously a costly municipal undertaking (in a London Borough it amounts to 1/7th of the net expenditure) but as a public health safeguard it is an essential function. The presence of food debris in dustbins promotes fly breeding, and it would have been advantageous if the war-time practice of collecting and disposing of it separately had been continued, provided suitable receptacles were used. The use of a garden compost heap in this connection is far too infrequent (*see page* 122).

Dustbins of 3½ cubic feet capacity, usually of galvanised iron with tight lids and in good repair, are placed on concrete plinths. Non-metal receptacles which make less clatter when moved can now be procured. There are advantages in using waterproof paper bags which are expendable; they overcome the difficulty of thoroughly cleansing the conventional dustbin.

Disposal is in most cases carried out by controlled tipping, which if properly undertaken is without public health danger. Other methods are incineration, pulverisation and discharge in the sea well away from the land. Composting on a large scale appears to be an admirable method of scientific disposal which is of agricultural importance.

In the Garchey system which originated in France and is used in blocks of flats, domestic refuse is deposited in a sink and washed away into a chute which connects with a collecting chamber.

SEWAGE DISPOSAL

Earth and pail closets, and cesspools are fortunately seldom encountered now except in country districts. A cesspool must not

leak; it acts as a receptacle for sewage which must be emptied periodically. Normally, house drains connect with sewers leading either to the sea or to sewage works. At the works the first process is screening followed by treatment in covered tanks where organisms acting in the absence of oxygen (anaerobes) liquefy the sewage; sludge is removed and the effluent passed through filter beds where it is oxygenated and other bacteria (aerobes) complete the purification process. These are the basic principles which, of course, are modified and elaborated very much in different plants.

The disposal of town sewage on the land is a method not now employed to any extent in this country, but it is a common practice abroad. The spreading of excremental diseases is a danger when water supplies are contaminated and vegetables grown on the land are consumed uncooked. The risks in a well-planned and supervised sewage farm are very much reduced; but the smell may give rise to complaints. The choice of the site and the selection of land with a suitable sub-soil, which is well drained, are first considerations. (*For information on sewage disposal in camps see page* 113.)

The presence of detergents in increasing amounts in waste waters from factories and houses is causing concern. Foam, many feet in depth, often occurs in sewage works and water-courses, where particles are wafted about like snow in the wind. A more serious effect is the reduction in the amount of oxygen available for purification of the effluent. It follows, therefore, that in the absence of oxidisation, river pollution will increase. It is gratifying to know that progress is being made in the manufacture of detergents which are free from these imperfections.

Another new problem is the disposal of radio-active wastes. Some of these can be let into the sewers without risk, others need special disposal. This is a matter for the closest liaison between local authorities and the atomic energy authority. All users of radio-active substances must be registered, and a national waste disposal service is being set up.

WATER SUPPLIES

A safe and sufficient supply of water is a necessity. To be "safe" it must be free from dangerous organisms which cause cholera, diseases of the typhoid and dysentery groups, jaundice from rat urine, or the larvæ of intestinal worms. Chemicals in solution may

also make water unfit to drink, whilst hardness makes cooking difficult, is wasteful of soap, and clogs boilers.

In a temperate climate an allowance of $1\frac{1}{2}$ pints a day is required for drinking; but the total needed per head of population for cooking, washing, water-carriage of sewage, domestic and public cleansing, fire-fighting and industrial purposes, totals 30 to 40 gallons per head daily.

All water comes from rain which may be impounded in reservoirs in upland areas, or obtained from deep or shallow wells tapping underground water which collects from seepage through the soil. Rivers supply a large proportion of municipal water—two-thirds of London's water comes from the Thames and one-sixth from the Lea; the remainder is from deep wells.

All water is suspect unless obtained directly from uplands far removed from animal and human sources of contamination. Shallow wells are almost always infected and even deep wells may be impure when faults in the strata allow sewage to seep through. Purification is carried out on a large scale in this country. The steps in the process are:

(i) Storage, which kills off most dangerous bacteria in a few days.
(ii) Filtration—usually through sand and gravel.
(iii) Sterilization with chlorine.

The same principles, other than storage, are employed in swimming baths, where the water is in continuous flow.

On a small scale, boiling is safe and easy. To make the water more palatable it can be aerated by pouring a few times from one container to another. If there is much suspended matter filtration is required: this can be done in special canvas bags such as were used by our troops during the war. Chlorine sterilization can be effectively carried out by bleaching powder or Halazone tablets (one tablet per quart of water for half an hour before use). Tincture of iodine (one drop per quart for half an hour) is another useful sterilizing agent. Potassium permanganate crystals (a pinch in a quart for about four hours) has long been used for "pinking" wells, but other methods are considered safer. Domestic candle filters require careful maintenance, otherwise they cease to do their work properly. They are not, therefore, generally commended. Metal filters ("Stella" and "Meta") in which the water passes

between coils of wire or metal discs 1/3,000 inch apart, used in conjunction with a filter powder (Kieselguhr), can be employed in large or small sources of supply: they form part of the equipment of mobile water purifying units used by the Army.

The amount of chemical sterilization necessary depends on the degree of contamination of a particular water. It is a common practice to add more chlorine than may be necessary, and to remove the excess—and the taste—by the final addition of sodium hypochlorite ("hypo"). More elaborate methods are used in municipal supplies.

THE HYGIENE OF CAMPING

A camping holiday gives healthy and enjoyable recreation in the open air, and good training to young people. Its value is recognised in the Education Act 1944, which, as well as requiring local authorities to provide adequate facilities for recreation, also allows them to establish and maintain holiday camps and organise expeditions.

Camping teaches the young to fend for themselves and to "rough it"; to prepare their own meals and engage in communal activities. It is an exercise in practical hygiene during which hygiene disciplines are learned and the need for them brought home to everyone. A camp with a low standard of hygiene soon becomes unpleasant and dangerous to health.

In permanent hutted camps or established sites for tentage, where there are a piped water supply, a water-carriage sewage system and properly constructed cookhouses, the main needs are good personal hygiene and general cleanliness of the camp. Where these amenities are not present there is no reason why the camp should not be healthy; but it must be well organised and disciplined, use being made of improvised methods of sanitation, which, however, are only advisable in short-stay camps. Some of the more important principles of camp hygiene are summarised here.

GENERAL PRINCIPLES

SITE

Select gently sloping ground, with sand or gravel sub-soil. Avoid steep slopes, narrow valleys, the proximity of marshes, scrub and thickets that breed or harbour biting insects.

WATER

Preferably a municipal piped supply or a convenient water point where a water cart can be filled. No water from a spring, well, stream or lake should be considered fit to drink unless previously sterilized by boiling or chlorination. Bleaching powder is normally used for sterilizing bulk supplies, but expert advice is necessary as to the amount required and the technique of chlorination. Tablets for purifying small amounts—as in water-bottles—together with de-tasting tablets ("Hypo") are now available. Sterilization of clear water takes half an hour. Ten drops of a chlorine solution such as Milton may be added to each pint. After shaking, the water is left for 10-15 minutes before drinking. When water is not clear, it should be strained through a clean handkerchief before sterilization. (*See "Water Supplies", page* 110.)

DISPOSAL OF WASTE PRODUCTS

Latrines are sited on the leeward side. In the absence of a water-carriage system, bucket or deep-trench latrines may be used. Buckets are not very satisfactory; if used they need well-fitting, self-closing lids, and a concrete platform beneath. After emptying (usually by a contractor) there should be thorough cleansing and the application of a disinfectant. Chemical closets contain caustic soda or phenol which render the contents innocuous: they may be emptied into a pit, which should not be near a source of water. Deep-trench latrines and Otway pits are a form of septic tank, which if properly constructed and fly-proof, are satisfactory for temporary camps. For overnight staging points and camps occupied for less than two or three days, shallow-trench latrines are dug. The trenches are 3 feet by 1 foot and 2 feet deep, placed 2 feet apart: the Army scale is six per 100 men. Each user places a scoopfull of earth in the trench, which is filled in when not quite full, and the turf replaced over oiled sacking to prevent fly-breeding. Used ground is marked with white stones. Urine from improvised troughs or funnels is led to soak pits, 4 feet by 4 feet by 4 feet, filled with broken stones and clinker. Urine pails for night use are emptied into these pits (*figs.* 28, 29 & 30).

Water from cookhouses and ablution places soon fouls the ground if the grease is not removed. This is done by adding lime and sulphate of iron, or by passing through cold water grease traps.

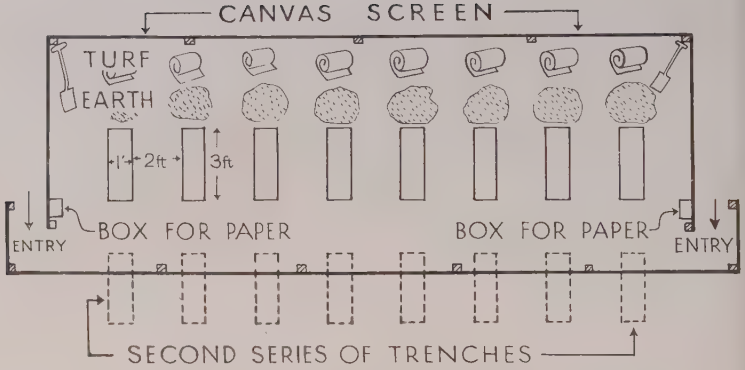


FIG. 28: **PLAN OF SHALLOW TRENCH LATRINE**

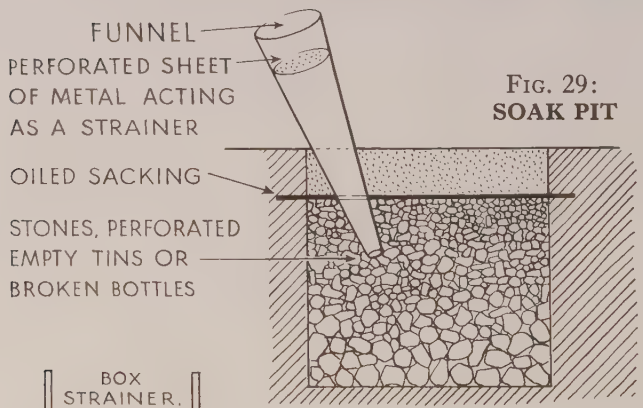


FIG. 29: **SOAK PIT**

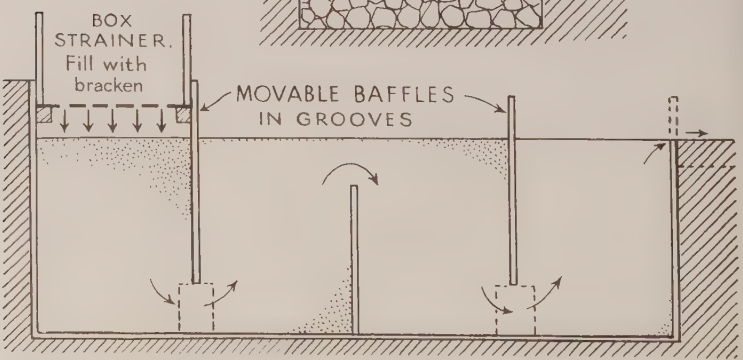


FIG. 30: **COLD WATER BAFFLE PLATE GREASE TRAP**

Grease traps work on the principle that when warm, greasy water is run into cold water, the grease floats on the surface and can be skimmed off. Traps must be constructed correctly and are usually of brick or concrete. They have two baffle plates three-quarters of the depth of the trap, and a movable cover. In temporary camps they may be improvised from tins and boxes. The foul water is first strained through a wire mesh or a small trap filled with stones, grass or bracken.

A camp in which washing and cooking water is thrown indiscriminately over the surrounding ground soon becomes objectionable and eventually unfit for occupation. Swill-bins with tight-fitting lids, sufficient in number to prevent over-filling, are placed on hard standings near cookhouses and mess tents. The contents of litter bins are burnt in a turf or other improvised form of incinerator. (*Figs.* 28, 29 & 30.)

FOOD HYGIENE

The risks of food poisoning, always high in camps, call for rigid compliance with hygiene rules, which should be displayed prominently, and understood by all. Food freshly cooked and eaten is the safest, it must be protected from dust and flies and stored in a cool place. "WASH YOUR HANDS" is the slogan: the provision of soap, hot water, nail brushes and paper towels (not roller towels) at cookhouses is a responsibility of those in charge of the camp. Utensils, after cleansing with boiling detergent and rinsed, are dried in improvised racks. "RULES FOR COOKHOUSES" must be displayed prominently.

Individual mess-tins, cups, plates, knives, forks and spoons, are first scraped clean into swill bins. Two containers of boiling water, the first containing detergent, are available for further cleaning before and after meals. Utensils are dipped in each for five to ten seconds.

TENTS

Tents are erected 20 feet apart, with a 6-inch drain around each to remove surface water. Tent openings face away from the prevailing wind; sides and floorboards are raised daily, and blankets and bedding hung out to air. Food should not be consumed in sleeping tents.

EMERGENCY CAMPS

In camps hurriedly laid out in an emergency to accommodate homeless persons, large scale improvisation is required at first. Rapid organisation is necessary to prevent the spread of infection and other hazards to health. Registration and documentation on entry is the first step. Inspection by doctors or nurses should be carried out as far as possible, those suspected of having infectious illness being allocated to a special section of the camp. Dusting with insecticidal powders may be necessary. During screening on entry, reliable and experienced persons should be selected for supervisory duties and work in connection with hygiene and sanitation. Prompt attention to the disposal of excreta, in deep-trench latrines, and to the purification of water supplies, together with strict food hygiene, will minimise the dangers of an outbreak of infection. The organisation of a camp hospital, where patients can be isolated, will be one of the first steps.

CARAVANS

Caravan sites have hygiene problems similar to those of tented camps, but the huge increase in the number of caravans since the war (about 36,000 were manufactured in Britain in 1958 compared with 1,000 in 1938) has given them greater public health importance.

What cause most concern are not the caravans used by holiday makers—although many of the sites are open to criticism—but those, numbering 60,000, used as permanent homes. For the most part they are tenanted by young married couples, half of them with children. The main objections are cramped accommodation, fire risks, condensation and primitive sanitation. In only one or two caravans out of every ten is there piped water, and less than half the occupants have access to a bath. Pail closets are usual, but when there is no disposal point into a drain, the contents are liable to be thrown on to neighbouring land or into a stream. Communal lavatories when provided are too often insufficient in number and badly maintained. The disposal of waste water and kitchen refuse presents further difficulties.

Unfortunately, until recently, local authorities had inadequate powers under the Public Health Acts to exercise enough control, and reliance had to be placed on the co-operation of site owners and individual occupiers. Many gave it. The indications are that

caravan homes will increase in number and it is clearly desirable that their disadvantages should be offset by all practicable means, which must include health education and supervision.

There are now laws to regulate the use of caravans and movable dwellings. It is illegal for them to be used on any land without a licence from the local authority. Model standards have been adopted for caravan sites to ensure adequate and satisfactory arrangements for space between caravans, roads and footpaths, hard standings, fire-fighting appliances, water supply, drainage, sanitation and washing facilities, refuse disposal, storage space, and recreation space. A local authority may refuse to grant a licence if it is not satisfied that the site conforms to these standards.

Fig. 31.
A Smoky Chimney.
Measuring Smoke Emission with a Ringelmann Chart

FIG. 32: USE SMOKELESS FUEL DURING FOG. DO NOT 'BANK UP' A COAL FIRE AT NIGHT OR BURN RUBBISH.

FIG. 33: IF YOU ARE ELDERLY OR HAVE CHRONIC BRONCHITIS STAY INDOORS DURING FOG, KEEPING WINDOWS CLOSED.

FIG. 34: DOES YOUR CHIMNEY ADD TO DANGEROUS SMOG?

CHAPTER XVI

CLEAN AIR, NOISE ABATEMENT, PEACEFUL USES OF ATOMIC ENERGY, OCCUPATIONAL HEALTH

CLEAN AIR

Pollution of the atmosphere became serious when townsfolk began to use coal as a domestic fuel. There were complaints about it as long ago as the year 1300. In 1660, Evelyn the diarist described the stink and darkness which was making London "a suburb of Hell"! Many subsequent writers, Charles Dickens among them, gave equally dramatic descriptions. With the Industrial Revolution and the great increase in town population matters got steadily worse. At length laws were passed to limit factory smoke, but they had no marked effect, and they took no account of the domestic chimneys which were equally to blame (*figs.* 31, 32, 33 & 34).

After years of propaganda public opinion was stirred by the great smog of 1952 which caused 4,000 deaths in London alone. Following the report of a Select Committee the Clean Air Act came into force in December 1956. It is now an offence to emit dark smoke from any chimney except for short periods; new furnaces have to be as smokeless as practicable; local authorities are empowered to create **smoke control areas** with the approval of the Minister, grants being payable to householders in the areas towards the cost of converting heating appliances. Ships and railway engines are included in the regulations. Certain smokeless fuels are authorised. Since 1906, there has been legislation to control the emission of noxious fumes from factories manufacturing chemicals such as hydrochloric acid (*figs.* 35 & 36).

COMBUSTION

Air pollution is of two main types: (a) smoke, dust, grit; (b) noxions gases like sulphur dioxide and carbon monoxide. Vehicle exhaust gases add to the quota. The dictionary defines smoke as "any volatile and especially any carbonaceous matter escaping from a burning substance"; which means that the substance is not burning properly—that it is smouldering instead of

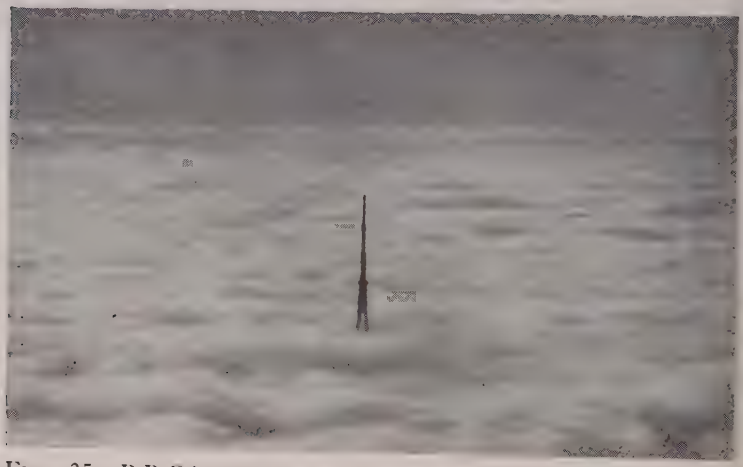


FIG. 35: B.B.C.'s TV MAST AT CRYSTAL PALACE PROTRUDES THROUGH FOG LAYER

FIG. 36: DAMAGE TO SUCH HISTORIC BUILDINGS AS WESTMINSTER ABBEY COSTS A FORTUNE TO RESTORE. SCENE FROM THE GAS COUNCIL'S SMOKE ABATEMENT FILM "GUILTY CHIMNEYS"

burning. Carbon in fuel unites with oxygen to form the harmless carbon dioxide, the hydrogen becomes water vapour. Without a good air supply carbon and the other constituents are not all burned and they are given off as smoke and harmful gases.

Coal is a complex substance. Apart from carbon, it contains other compounds which give off sulphur gases, oils, and tars during burning. The greater the proportion of carbon, as in anthracite and coke, the better the chances of preventing unnecessary smoke; the less the amount, as in peat and house coal, the greater the risks of making it. Any raw coal burned in the open domestic grate or in badly designed, incompetently stoked and overloaded boiler furnaces is bound to make smoke. The fundamental requirements are a suitable fuel in the correct appliance, properly tended.

The open coal fire is wasteful, expensive, dirty; moreover, it gives the housewife much unnecessary work. The hot air above it goes up the chimney, taking warm air from the room with it in uncontrolled amount. The habit of banking up domestic fires at night, particularly when wet refuse and slack coal are used, doubles the daily amount of atmospheric pollution, it also causes erosion of the chimney structure. In the domestic fireplace or factory furnace there must be sufficient air both above and below the burning fuel. The air from below—**primary air**—is controlled by adjustable apertures, that which passes over the fire—**secondary air**—fifteen times greater in volume, may be regulated by a throat in the chimney.

Domestic and industrial appliances burning solid fuel or gas may give off carbon monoxide, and oil-burning apparatus, sulphur dioxide. It must be remembered that dangerous, sometimes fatal, concentrations of these gases may build up in rooms which are unventilated, or not ventilated sufficiently to allow of frequent changes of air. The absence of a chimney giving direct communication between the apparatus and the outside air is fraught with danger.

FOG AND SMOG

The air near the ground is usually warmer than that higher up. As it rises air currents form which reduce the concentration of impurities. Under certain atmospheric conditions the reverse hap-

pens, and it follows that a layer of cold air, in which the water vapour has condensed, is trapped near the earth's surface. It cannot get away and so becomes progressively more contaminated with smoke from houses and factories. This is the smog which every so often steps up the dose of irritant and poisonous matter taken into the lungs.

THE COST

It has been estimated that atmospheric pollution which, to a greater or lesser extent, is going on all the time, costs the country more than £250 million each year in damage to buildings, books, fabrics and the like. It stunts or destroys vegetation, shuts out sunlight and causes transport delays and accidents. The national economy is further affected by the absenteeism from respiratory illness, the cost of treatment and the occupation of hospital beds. Bronchitis is one of the main causes of invalidism and death in Britain; it is far more prevalent here than in most other countries. The young and the aged suffer most. In this and in other affections of the lungs, throat and nose, impure air is the villain of the piece. Cancer of the lung, too, which is showing an alarming increase, has a higher incidence in those who live, or have lived, in a smoky environment.

It is the duty of all to participate in the campaign for clean air by helping to make the new Act work. The tradition of the glowing coal fire is deep rooted, but like many traditions it is now known to be illogical and dangerous. Unless the old methods of heating are replaced by new ones using smokeless solid fuels in approved appliances, or gas, electricity or oil, the health of the nation will suffer still further. The principles on which smoke prevention depend are easily learned: the public health department is available for advice and guidance.

BURNING REFUSE

Garden bonfires give off thick smoke which damp material makes denser still. Burning also destroys a valuable fertiliser. Composting does away with this additional source of air pollution, and provides a means of enriching the soil. Briefly, the process is as follows:

Select a small area in the garden, dig it over lightly, cover with

ashes for drainage, and place a few stones at the sides. Throw on leaves and garden refuse to a depth of 1 foot (but not weeds, which should be piled separately in a corner), sprinkle a solution of sulphate of ammonia over the pile, and cover with a thin layer of earth. Repeat the process, this time shaking on a little garden lime instead of ammonium sulphate; and so on. For 10 lb. of refuse ½ lb. of ammonium sulphate and the same quantity of lime are needed, with 4 gallons of water. "Accelerators" may be used instead of ammonia. Any manure added to the heap will speed up the process of decomposition (which takes from 6 to 12 months) so will peat and pond mud. Leaves, if in large quantity, may be treated separately or buried in spare ground; if packed tightly they will take much longer to decompose.

OTHER FORMS OF ATMOSPHERIC POLLUTION

POISONOUS DUSTS AND SMOKES

Workers in certain industries may be exposed to dusts and smokes, the inhalation of which is harmful. They include the dusts of poisonous metals (manganese, lead, mercury, arsenic, among others); corrosive substances (lime); dusts of vegetable origin (cotton, flax, grain, feathers, wood, etc). The term used to describe all dust affections of the lungs is pneumoconiosis. Most commonly found in coal miners, it can arise in the cotton industry, in foundry workers, in the manufacture and processing of asbestos, and in other trades.

Among the dust-borne infections are anthrax—**"woolsorters' disease"**—following the inhalation of anthrax spores, and **"farmer's lung"** which is caused by the entrance into the lungs of dust from mouldy hay, containing a fungus. In a large group of diseases, which includes tuberculosis, measles, whooping cough, influenza and the common cold, spread from person to person, is by organisms carried in the air. This is known as **"droplet infection"**: it is discussed elsewhere in this book.

NOISE

Noise is a public health nuisance which has not received the attention it merits. With the advent of the machine age it was inevitable that noise should increase, and it has done so progressively, side by side with the enormous growth of mechanisation

which the twentieth century has witnessed. Jet-propulsion is a new and disturbing factor. It is not a matter for surprise that public complaints are numerous, and that more attention is being given to the health aspects of excessive noise.

There is no simple definition of noise, the dictionary describes it as "a loud outcry, din or disturbance, or a harsh sound of any kind", but a noise which irritates some—often because it has unpleasant associations—causes no annoyance to others. The word is of doubtful origin; possibly, it comes from a Latin word meaning nausea, which people with sensitive ears will agree is a suitable definition. The reaction to noise is governed by the circumstances, the time, place, occasion, as well as the character and duration of the sounds. Sudden, unexpected noises can be more vexatious than continuous ones. Unwanted sounds engender anger or fear and frayed nerves—those from a pneumatic drill, a barking dog (in the next-door garden!), an open-exhaust motorcycle, the banging of car doors and the revving-up of engines after midnight. But the spectator delights in the roar of the football crowd and the noise on the dirt-track; the pianist does not object to loud-pedal music nor the drummer to the vibrations he produces; the pleasure-seeker revels in the din of the fair-ground. The town dweller will lie awake in the silence of the country: the countryman finds sleep difficult until he has become acclimatised to city noises.

The relationship between noise and health has not yet been determined fully, but it cannot be doubted that one exists. It is well known that excessive noise can cause temporary loss of hearing (or even perforation of the ear-drum), and if the noise is repeated often, permanent deafness may follow. This was recognised in the nineteenth century as an occupational risk of blacksmiths, boiler makers, riveters and others. Workers in noisy occupations should be selected after medical examination, which should be repeated to ensure that the hearing apparatus is not being damaged.

But what of the psychological (mental and emotional) ill-effects? There are obstacles in the way of their assessment, because, as has been said, people differ in their reactions, conscious and unconscious, depending on whether or not they find a noise "unpleasant". Resentment, annoyance and anxiety (which "give people the jitters") can affect the appetite, cause insomnia and evoke fatigue. In the home irritating noises act as an encroachment on domestic

privacy, which may foster tension and disharmony. The stolid seldom appreciate the feelings of the impressionable. Excessive vibrations may give rise to sensations in the head and chest, causing headaches, and in some cases, nausea and vomiting; though these symptoms may be largely psychological.

It is not simple to give a scientific measure of noise. Sound is made by pressure waves of different frequency and amplitude. Loudness is governed by the amplitude of the vibrations, which cause more or less pressure on the ear drum which, in turn, vibrates; the greater the number of vibrations per second, the higher the pitch of the sound. Sound waves are audible to the human ear between frequencies of 20 to 2,000 cycles per second. Sound is registered in the inner ear by the organ of Corti, shaped like a shell, and containing fine hairs. But the only true assessment of sound is made by the brain, which interprets messages from the ears. It is a subjective matter; physical recordings of sound by scientific instruments cannot take its place. Scientists are, however, able to compare the loudness of sounds of the same type, with increasing accuracy. This measure of loudness is expressed as a **phon.** Another unit, the **decibel,** is popular nowadays, and many people think of it as another word for "noise". It does not give a measurement of noise, but only compares one sound with another, or rather, it compares the energies or "sound pressure levels". Since sounds must be compared with some standard, a "reference level" or zero is taken as being the sound just audible in quiet surroundings. The decibel scale is complicated, and the numbers ascribed to certain sounds (ratios) do not give a simple picture of their relative loudness. Some noise levels in decibels are: a whisper, or the sounds heard in the quietness of the country—20 to 30; ordinary conversation—60 to 70; heavy traffic—80 to 90; a noisy factory or works, a tube train—100 to 110; near a jet engine—140 to 150; and near a rocket—180 to ? *. A noise intensity above 90 or 95 can do harm to the sensitive organs of hearing. Those exposed to these noises, day in and day out, need periodic hearing tests and the regular use of ear protectors.

Action to prevent unnecessary noise has been stimulated by the formation of the Noise Abatement Society, and results are already

**Aircraft noise is now measured by a new method, in units called "perceived noise decibels"* (PNdB).

being achieved. Noise prevention has two main facets—the personal and the constructional. The first depends on good manners and a regard for the feelings of other members of the community, and, as in litter prevention, education and propaganda are important. The second is linked with proper planning and construction of dwellings and factories, with sound-proofing and with better designed and suitably installed machinery. Adaptations to reduce noise and vibration in the home or office are not necessarily expensive; much can often be done by improvisation.

It is not always easy today to distinguish between "unnecessary" industrial noise—that which can and should be prevented—and "unavoidable" noise, the accompaniment of advances in mechanisation on land and in the air. The aim is to reduce the first as quickly as possible (and the fuller co-operation now being given by industrial concerns in bringing this about is noteworthy). To abate the second is more difficult but the task is not impossible, for what is classed as "unavoidable" today may be "preventable" tomorrow. Noise abatement is an important public health principle which must be pursued, but progress will be easier if some of the difficulties are understood and a reasonable attitude to them adopted.

Noise or vibration which are deemed to be a nuisance (i.e. one which interferes with the normal comfort of people or is injurious or dangerous to health) can be dealt with under the Noise Abatement Act, 1960. This Act is the first legislation in the country wholly concerned with noise abatement. Three or more householders who are aggrieved can make complaint. The use of loud speakers on public highways between certain hours is restricted. In the event of legal proceedings resulting from a noise nuisance, a good defence will be that the best practicable means have been used for preventing and for counteracting the noise or vibration.

Noise (and vibration) caused by aircraft is excluded from the Act. It may well be that this Act will be followed by further and more comprehensive legislation to control unnecessary noise. A research scheme is planned to obtain reliable information on the effects of industrial noise on hearing, and to study preventive measures.

PEACEFUL USES OF ATOMIC ENERGY

Radioactive substances are being brought into use in everyday life to an increasing extent. In fact, they are rapidly becoming

indispensable. Quite understandably, the vast possibilities of atomic energy as a friend of mankind have been overshadowed in the public mind by its potentiality for destruction. In voicing the hope that radioisotopes would be used to a greater extent in industry, with considerable financial saving, the chairman of the Atomic Energy Authority has said that nothing has suffered more than atomic energy from "guilt by association".

The subject of radioactivity and its manifold applications is too large and too complex to be discussed at any length in a book of this nature, but since there is a need for everyone to know a little about it, space must be found for a very brief account of the present position. Its service to curative and preventive medicine must be of particular interest.

There is no doubt that nuclear energy will be utilised as a major source of power in the future, but it will have many other uses in the industrial field. Already gamma-rays from radioactive isotopes or X-ray apparatus act as devices for measuring with extreme accuracy the thickness of metals, or for detecting flaws in castings and estimating the wear in pistons: fluid levels can be measured and leaks in tanks and pipes discovered. These functions depend on the fact that substances that are radioactive send out rays which can be picked up by suitable apparatus—they are, indeed, miniature transmitting sets. The most minute amounts can be detected, and this allows them to be employed as "tracers". They are most important aids to medical diagnosis, for the amounts used are so small that there is no hazard to the patient. There are many ways in which the phenomena of radio-activity help the scientist. The archæologist, for example, can calculate the age of his discoveries by making use of the knowledge that all living things take up a radioactive isotope of carbon from the atmosphere, and have been doing so for millions of years. When death occurs the carbon disintegrates at a known rate, so measurement of the amount of radioactivity present in a find gives a good idea of its age.

There is no need to dwell on the incalculable benefit to the human race which has followed the discovery by Roentgen in 1895 of rays—now known to everyone as the X-rays—which had the power of penetrating solid matter and darkening photographic plates. It is difficult to imagine today how the doctor could carry on without their help. A great debt is owed to the early pioneers,

some of whom suffered irremediable damage to their tissues as a result of exposure; this suggested that here was a new means of destroying cancerous growths. A year or so afterwards Madame Curie discovered radium, an unstable element which gave off alpha and beta particles and gamma-rays—in other words it was radio-active. This was of immense importance in connection with the structure of the atom; the surgeon was able to use this new element also for the treatment of malignant disease.

Medicine and medical research are now being assisted in many other ways: the electron microscope has revealed the viruses (e.g., the virus of poliomyelitis, which has helped in the study of the disease), and new light has been thrown on physiological processes, as in the growth and behaviour of tissue cells in the body. The life-cycles of insects can be observed and their movements followed with exactitude by "labelling" them radioactively. In this way it has been confirmed that the housefly picks up infected material from open pail-closets and carries it to human dwellings, and that it may travel as far as ten miles. Sources of pollution of drinking water can be traced, and information gained as to the nature and extent of contamination of rivers and beaches with sewage.

The possibility of pasteurizing or sterilizing food by exposing it to ionizing radiations has been studied closely. Although still in the experimental stages, so encouraging are the results, that the procedure holds out great promise, indeed, it may well be the method of choice of tomorrow. For example, meat ("measly" meat) with cysts containing the larvæ of worms like the small spiral flesh worm (*trichinella spiralis*), or the tape worm (*Taenia solium*) which can infest man through the consumption of uncooked pork, is rendered safe. The devious pathways followed by such parasites in their journeys through the body may also be mapped. In Chapter VIII mention was made of the depredations of insects, and the vast amount of stored grain and other food which they destroy. Irradiation is an invisible but lethal weapon, which by removing infestation can help in conserving the world's food supplies.

Irradiation prevents the putrefaction of food by the action of bacteria and moulds, and the penetrating power of the rays allows foods already packed and in containers to be treated, with a prolongation of "the shelf life". The dosage depends on the radio

sensitivity of the particular organism. The temperature of the food is not raised sufficiently to affect it, and it is not itself made radioactive, so it remains quite safe for human consumption. It has been found that some change in smell, colour and taste takes place in certain foods. Sterilization of imported frozen eggs, many samples of which have been found to contain organisms of food poisoning, is an example of how foodstuff which cannot be treated by heat, may be dealt with. It is possible that in future both the old methods —heat treatment and the use of antibiotics—and the new—radiation—will be used in combination in the preservation of certain foods. Another interesting application is in the prevention of sprouting in stored potatoes and other root crops, and in the destruction of aphids which winter on vegetables and carry a virus disease of plants.

Pharmaceutical products, which are spoiled by heating and cannot, therefore, be sterilized by conventional methods, may be irradiated without risk, and similar treatment can be given to syringes, ampoules and sutures. It is interesting to note that the irradiation of plastics makes them more resistant to high temperatures; afterwards they may be sterilized by heat.

More than half a century of research on radioactivity, its properties and dangers, has shown how it can be put to profitable use in many walks of life, and what is of paramount importance, how it can be harnessed and its harmful effects nullified. The few details given here may help the reader to take a rational view of the subject. The Atomic Age which is just beginning has to be accepted as inevitable: the new source of energy which it has brought, if used wisely and peacefully, will prove of inestimable value to man. A large share of the benefits will fall on hygiene and public health.

The use of radioactive substances is rigidly controlled by legislation, and full instructions on the precautions to be taken have been given in codes of practice and official memoranda. Certain industrial processes such as luminising are subject to special precautionary measures. New legislation deals with the registration of all users of these substances and with the control of radioactive wastes. A national disposal service is to be set up. Experiments necessitating the use of radioactive sources in the laboratories of schools and colleges will increase, and special memoranda

drawing attention to the precautions to be taken have been issued. It must be remembered that the hazards are invisible and quite different from those normally encountered in the school laboratory, but margins of safety are laid down which will counteract any possible dangers.

OCCUPATIONAL HEALTH

It will have been seen that what is classed under the collective heading of "environment" is made up of many parts, all of which exert an influence on health. One of these is **occupation.** Its importance may be judged from the fact that most adult males, and very many women, spend a large part of their lives out at work, often in industrial surroundings.

The industrial revolution of the late eighteenth century, and the beginning of the machine age, brought social evils and new hazards to health. People who had spent their lives in the fields began to crowd into factories and workshops, working for long hours in conditions to which they were not accustomed. Many young children from Poor Law institutions were taken to work in the cotton mills. The new environment was not favourable to health. Droplet and other infections spread easily: there were special risks attached to certain occupations. Poisonous metals such as lead, phosphorus, arsenic and mercury, together with fumes and dusts caused illness among workers in what became known as "dangerous trades". There was a great deal of factory legislation in the nineteenth century, some of it ineffectual because it was not enforced. In 1819 the employment of children under 9 years of age became illegal, and the working week was restricted to 72 hours. Following a Royal Commission came the Factory Act of 1878 which consolidated previous legislation. Known as "the great statute" it was followed by more effort to protect those engaged in processes injurious to health, and bit by bit, there was improvement in conditions of work—cleanliness, sanitation, heating, lighting, ventilation—and less crowding. Measures were taken to reduce accidents, which together with certain industrial diseases were made notifiable. More recent steps include protection against excessive noise and radioactive substances.

The appointment by the big concerns of medical and nursing staff was a noteworthy event. It enabled managements to obtain

expert advice on matters of health and welfare, with regular medical supervision of employees, and emergency treatment when illness or injury occurred. This service has expanded rapidly. Personnel selection—brought into use by the Army medical services during the war with great success—is now well established. It aims at placing the right man in the right job, which in turn guards against anxiety, frustration and unrest, and the loss of efficiency, breakdown and absenteeism which are their sequels. It reduces accident risks. Welfare services, canteen arrangements and facilities for recreation all help to improve industrial life. The liability of the business executive to certain complaints has already been mentioned, and the promotion of his health as well as that of the manual worker is now being given attention.

Medical services in industry came into being in order to safeguard the health of the employees: it became apparent very soon that they were a benefit to the employers as well by improving good relations and increasing efficiency. Enquiry into the sickness and accident rates in different occupations revealed many of the causes and pointed the way to prevention. The majority of big factories and industrial concerns have their own medical services, but few of the small ones are so fortunate, although their need is no less. An occupational health service on a national scale to embrace all who work in factories, offices and shops, has been advocated. The Offices Act (1960) which came into force in January 1962, was designed to fill one of the existing gaps. Regulations are awaited which will specify standards as to structure, sanitation and cleanliness, lighting, heating and ventilation, and for the prevention of overcrowding and accidents. It will be the duty of the local authority to enforce these provisions.

The administration of the Factories Act is undertaken by government inspectors, but local authorities have certain duties in connection with sanitation in factories where mechanical power is not used. Appointed factory doctors are responsible among other things for the supervision of young persons in industry.

Much progress has been made in the resettlement of **disabled persons** in industry. Training courses and attendance at special rehabilitation units help those who are recovering from sickness or injury to re-equip themselves for suitable occupation, after their capacity for work has been assessed. A disabled person may apply

to have his name placed on a register. The Disabled Persons Employment Act (1944) helps the physically or mentally disabled to obtain work by requiring employers to accept a certain proportion of handicapped persons. Disablement resettlement officers attached to Ministry of Labour offices have the duty of helping the disabled to find employment. Councils may set up sheltered workshops and other facilities, and give assistance to handicapped persons employed at home. There are special provisions for the welfare of the blind.

OUTWORKERS

One of the industrial evils of the last century, which caused public outcry, was **outwork**—work given out by employers to be undertaken at home. This was usually carried out under bad conditions—as in the tailoring trade with its "sweated labour"—and in 1891 legislation was brought in to prevent it. The matter has been watched very closely ever since. Only certain specified work is allowed, and lists of outworkers must be sent to the local authority, whose officers carry out inspections of the premises. More recently action was taken to prevent the objectionable practice of sweet-wrapping in rooms where there was obvious danger of transmitting food infections. It has long been illegal to carry out work in connection with wearing apparel in homes in which infectious disease has occurred recently.

CHAPTER XVII

FOOD AND NUTRITION

Man's primary physical need is to find food. Hunger is Nature's warning that fuel for the body machine is running low. The power of hunger is strong and animals will go to any lengths to satisfy it. Enough nourishment must be found to supply the needs of the growing offspring as well as to give the adult strength to labour in the perpetual quest for more food, and to keep enemies away. To till the soil, hunt, fish and protect themselves from attack were the main occupations of early men—it is much the same today, even though it is accomplished indirectly by so many. What is eaten is governed by what is available, and time and again there has not been enough, or not enough of the right food to maintain health properly. When the crops failed and game became scarce starvation or near-starvation overtook the tribe, and those that did not perish wandered off in search of more productive territory. The history books abound with references to famine and its consequences—of nations so depleted and debilitated that they were unable to repel attacks from foreign invaders; of large migrations of people when poor harvests made it impossible to maintain an increasing population. Among other causes of food shortage are a lack of knowledge of scientific agriculture, soil erosion, weather, the depredations of locusts and other pests, debilitating illness like malaria, and disease of animals. A country without natural resources and without manufactured products to exchange has nothing to barter for food from other countries.

In the undeveloped parts of the globe a great number of people, mostly children, are suffering and dying from malnutrition at the present time. They may be getting enough to eat, in bulk, but certain constituents (e.g., proteins) essential for growth are lacking. This question of the suitability as opposed to the quantity of the food intake is important even in our own country though, fortunately, not as much as formerly.

A **balanced** diet is one in which all the essential foods are present in the correct proportions to meet the needs of the body. These needs are **heat and energy, repair of tissue wastage, growth and reproduction, and regulation of body activities.** The normal conventional diet of today supplies these needs, but it is surprising how often likes and dislikes, laziness, prejudice and ignorance unbalance the diet. Not so long ago malnutrition among British children was all too common, but health propaganda, the availability of good food, the ability to purchase it, and the setting up of a school meals service with free milk, have contributed to the great improvement in health and physique of present-day children. Despite the inevitable food restrictions of war time, there was small evidence of nutritional deficiency thanks to the contribution of a welfare foods service, which enabled children and expectant mothers to obtain dried milk, cod liver oil, orange juice and vitamin tablets.

There are certain elementary facts about the complex subject of nutrition which should be known to all, so that they may be applied in everyday life. There should be some acquaintance, for instance, with the composition and food values of the commoner articles of diet. Food does not need to be very costly to be nutritious, the cheap joints of meat and fish give as much protein as the expensive, and the informed housewife knows the best foods to buy within the family budget. These are matters which are well explained in many non-technical booklets on food, one of which should find a place in every home. One of the things about which few can afford not to keep up to date is the planning of the weekly dietary and the use of new recipes.

The dietician does not think only in terms of chemistry. Food if it is to be enjoyed and digested so that it supplies the maximum nourishment has to be correctly cooked and served, attractive in appearance and good to the taste. To speak of an appetising smell is to say that the digestive juices are beginning to flow. A monotonous diet does less good than one with variety. The stomach is very sensitive to anger and emotion and to fatigue, so it is as well to give the body time to return to normal before sitting down to a meal. Many people over middle-age eat too much of the wrong sort of food: they would do well to remember the maxim that it is wise to rise from the table feeling a little hungry.

NUTRITIONAL FACTORS IN FOOD

The substances in food which the body needs are called **nutrients.** They may be placed in five groups, namely **proteins, carbohydrates, fats, minerals,** and **vitamins.** Most foods are a mixture of these in varying quantity.

Proteins, which are complex compounds of amino-acids, are indispensable to all animals and plants. Without them growth cannot take place, neither can the wastage of tissues which is always going on be repaired. Proteins can also supply the body with fuel. Children and expectant and nursing mothers therefore need a good supply of protein, as much or more than older people who have stopped growing, who rather require more energy-producing foods. What are known as **first-class proteins** are present in large amounts in meat, cheese, fish, poultry, eggs and milk; **second-class,** or **vegetable proteins,** are found in peas, beans, lentils, nuts, cereals. Other foods contain smaller amounts. There is no sharp division between the two, but in order to supply enough protein, larger amounts of food in the second category must be eaten than in the first. It is customary for vegetable proteins to be used to supplement the animal protein intake. Easily assimilated foods such as milk and eggs, give the young child what it needs.

Carbohydrates supply most of the fuel for energy and heat. They are cheap foods by comparison with proteins, which if taken in greater amount than the body wants are converted into energy which carbohydrates can furnish at less cost. They are available as sugar (sweet fruit, honey, beetroot, carrots, onions and milk) and starch (potatoes and cereals). The body can store them and convert them to fat. Energy is expended by the body at all times, even when at rest, to keep the human engine "ticking over". The beating of the heart, breathing, digestive processes, maintenance of muscle tone are among the functions which use up fuel; much more is burnt when there is greater muscular activity. The manual worker needs more carbohydrates than the clerk, the athlete more than the spectator. Other things being equal, people who eat too much carbohydrate food tend to get fat. Cellulose, another carbohydrate, makes up the framework of plants: it is not absorbed to any extent, but supplies the necessary "roughage".

Fats are a means of providing and storing energy in concentrated form. Fat deposited beneath the skin protects the body and helps

to keep it warm. In order that fat may be broken down properly there must be enough carbohydrate available in the body, consequently, if an excess of fatty food is eaten without enough sugary or starchy food, unpleasant symptoms may follow.

Minerals. Many elements go to make up the complex human system. Apart from carbon, hydrogen and oxygen which account for more than 90 per cent of the body weight, there are at least ten elements which the body finds indispensable; they are calcium, sodium, potassium, magnesium, iron, phosphorus, sulphur, manganese, chlorine and iodine. Other elements such as fluorine are used in lesser amounts. **Calcium,** with a little magnesium and phosphorus, makes teeth and bone: milk and cheese can give the body three-quarters of what it wants. **Iron,** with protein, makes the vital compound called hæmoglobin, which carries oxygen to all parts of the body: lack of it is a cause of anæmia. It is found in liver and kidney and in eggs, beef—including corned beef—wholemeal bread, fish, baked beans, chocolate, watercress and blackcurrants. In sickness, adolescence and pregnancy it may be necessary to give iron in tablet or liquid form. Over-doses are poisonous, and children have died from eating the attractive green tablets which they have found lying about. **Sodium chloride** is excreted in the sweat; in very hot countries an extra salt ration is needed to replace it. Sodium also affects the strength and amount of the body fluids. It must be reiterated that a good sensible diet gives all the minerals and the vitamins the normal body needs.

Vitamins. The body cannot make its own vitamins, which must reach it, in the very small amounts necessary, by way of food. They are available in any normal diet provided the food is fresh and suitably cooked. The discovery of the rôle of these substances in preventing **deficiency diseases** is one of the triumphs of modern medical science. Vitamin pills have a place in nutrition, and children, adolescents and expectant and nursing mothers benefit by them, but their widespread use today is largely unnecessary; in fact, if taken to excess they can do harm. **Vitamin A** (found in halibut and cod liver oil, liver, eggs, butter, margarine, cheese, herrings, carrots, spinach, dried prunes and apricots, tomatoes, watercress, etc.) is the growth vitamin; a deficiency affects mucous surfaces and causes night blindness. **Vitamin D** prevents rickets, and plays an important part in the absorption of calcium and

phosphorus to form the calcium phosphate of bone, Ultra-violet light promotes its formation, and diminishes the amount of vitamin D required. It occurs in the foods that are rich in vitamin A; herrings and sardines are a useful source. **Vitamin B** consists of a number of vitamins which are concerned with the utilisation of carbohydrates by the body, and with growth. Those who do not get enough do not grow properly; appetite is affected; there are digestive disorders, skin complaints, with soreness of the tongue, depression and irritability. Very serious diseases called beri-beri and pellagra occur abroad among people whose food does not contain these vitamins. Those engaged in heavy work need more vitamin B1 than sedentary workers. These vitamins are found in a variety of foods (yeast, oatmeal, bacon, pork, peas, beans, potatoes, wholemeal bread, white bread to which vitamin and iron are added, etc.). **Vitamin C** is not so generally available in the domestic dietary as the other vitamins because it is most common in fruit and vegetables which are hard to get out of season. It is rapidly lost on storage or if bruising occurs, and when the vegetables are cut up. Vegetables should be placed in the minimum quantity of boiling water and served immediately after cooking; the water used should be incorporated in the gravy. Absence of vitamin C causes scurvy, a scourge of former days, but by good fortune no longer seen in this country. Less serious deficiencies do occur, causing infections of the mouth, retardation of growth, pains in the joints and a tendency to bruising. Tinned and quick-frozen foods do not lose much vitamin C. To ensure that there is enough of this vitamin in the family diet in winter the following articles should be included frequently: grapefruit, tomato soup, tomato cocktail, spaghetti in tomato sauce, oranges, blackcurrant jam, braised parsnips, carrots, cabbage and raisin salad, cauliflower au gratin, grilled liver, potatoes and onions; with orange juice or other vitamin C drinks for the children. Vitamin C appears to have no effect on either the prevention or cure of the common cold.

CALORIES

When energy is expended heat is produced, so a heat unit—the **calorie**—is a convenient measure of the energy power of foods. The calorie used in connection with food values is the amount of heat necessary to raise the temperature of one litre of water by one

degree Centigrade. An ounce of fat gives 264 calories, an ounce of either protein or carbohydrate 116. When the composition of a food is known it is a simple matter to calculate its energy value from these figures. A man lying at rest in bed needs only 1,700 calories a day; when engaged in ordinary work, from 2,200 to 3,000; but when doing heavy manual work, from 4,000 to 5,000. A woman needs rather less. As a guide to what this means in terms of every-day meals it is worth remembering that a breakfast of bacon and egg, toast, butter, marmalade, and coffee with milk and sugar yields about 800 calories. One ounce of cereal adds another 100 calories, so does another spread of butter.

Dieticians work out the requirements for groups of people in schools, institutions, hostels, in the Services and other places, and plan the menus accordingly. The housewife when giving her weekly order at the grocer's, greengrocer's, and butcher's, has no time to pore over tables and diet sheets, nor to work out the proportions of the five food constituents in what she buys. She tries to meet the likes and needs of all the members of her family—the baby, the schoolboy, the typist daughter, the husband doing heavy work in a factory. She is generally not very far wrong in her choice, but instinct and habit often lead people astray; there are few families, therefore, in which the purse and the health cannot be benefited from a good basic knowledge of the principles of correct feeding. The improved nutritional standard in this country shows not only that there is ample and suitable food available, but that people are learning more and more how to use it properly.

Many excellent and easily read books on this fascinating subject are now available. Two Family Doctor booklets published by the British Medical Association are particularly useful; they have been freely consulted in this chapter. Particulars of these and other books are to be found on page 148.

FOOD PRESERVATION

No food remains fresh indefinitely. Sooner or later bacterial action causes deterioration, the rapidity with which it takes place depending on the nature of the food and the measures taken to prevent it. The oldest of these measures is drying—in the sun or over a fire—which removes the moisture essential for bacterial growth. Smoking acts in the same way, aided by the preserving

action of substances in the smoke. Pickling in brine or vinegar are old forms of chemical preservation. Chemical preservatives (restricted to sulphur dioxide and benzoic acid) are allowed in specified amounts in certain foodstuffs such as sausages, sauces and fruit juices. The commonest ways of preserving food are by keeping it at low temperatures and by canning.

Freezing does not kill bacteria but it arrests their multiplication: meat from abroad, which is either chilled or frozen, is preserved in this way. Quick freezing methods of preserving freshly picked vegetables have been greatly extended in the last few years. In the process of canning the contents of the tin are sterilized by heat, air is excluded and the tin is sealed.

Dehydration, by reducing food weight and bulk, was important in war time; but there were objections to the change in appearance and quality of some reconstituted food. After the war, the defects were largely removed by freeze drying, a process in which water vapour is extracted from frozen foods under reduced pressure. The more elaborate technique of accelerated freeze drying is a further step forward. Foods, drugs, vaccines and blood plasma can now be treated in this way.

Storage of fruit and vegetables in an atmosphere of carbon dioxide gas is another method of preventing putrefaction. A still more recent means of sterilization, which is in the experimental stage but one which is likely to be used extensively in future, is exposure to ionizing radiations. The food which can be treated after it has been packed, does not itself become radioactive. This method when perfected may well revolutionize food technology by reducing the need for refrigeration.

The introduction of deep-freezing techniques and the wider use of domestic refrigerators have made it possible to keep foods fresh for long periods. These advantages may be offset if it is not remembered that when food that has been kept at a low temperature is allowed to remain at room temperatures, bacteria quickly multiply. It is between 50°F. and 145°F. that multiplication takes place most rapidly, that is why under the Food Hygiene Regulations food in food premises, unless exposed for sale must be kept at a temperature above or below these limits "without avoidable delay".

CHAPTER XVIII

MILK, TEA, COFFEE, COCOA, OTHER BEVERAGES, ALCOHOL

MILK

The young of animals that suckle their young—mammals—obtain all the nourishment for early growth from the mother's milk. Milk is unique as a nutrient that has only one purpose in nature—to provide food for the offspring. Cow's milk is one of the best all-purpose human foods: it is not "the perfect food" that it is sometimes called (no food is perfect), but it plays an important part in the feeding of children. Diluted with water and with the addition of sugar it is a good substitute for breast feeding. One of its special advantages is that it contains a high proportion of calcium, a pint of milk a day supplying three-quarters of the needs of children and young people.

Whilst it is a good food, it is also a good medium for the growth of bacteria, and in the past it has been responsible for carrying a great deal of disease. The most frequent was tuberculosis which came from infected cows, but typhoid, scarlet fever, diphtheria, sore throat and food poisoning germs were readily introduced at the time of milking or during transit when little regard was paid to cleanliness. Goat's milk transmits Malta fever which, until the cause was discovered, was widespread in the Mediterranean countries; in this country, undulant fever, a similar condition, is an occasional sequel to drinking raw milk from infected cows.

The campaign for clean milk, strenuously pursued for some years and reinforced by legislation, has met with success. Tuberculosis has been almost eradicated from cattle in Britain, and a high standard of cleanliness has been achieved in milk production at the farms and in dairies. Pasteurization (heating milk to 145°-150°F. for 30 minutes or to above 160°F. for 15 seconds, and cooling at once to 50°F.) by killing tubercle bacilli and other dangerous germs has saved many thousands of lives and has prevented a great deal

of suffering. Pasteurization is closely supervised by public health authorities, and samples of milk are taken regularly to ensure that it complies with approved chemical and bacteriological standards. The registration and inspection of dairy premises give further safeguards.

Dried and condensed milk, cream and artificial cream, butter and margarine, are also covered by legislation, as is ice cream. Disease-producing bacteria may be present in milk products. They are derived either from the milk and other materials from which the product is made, or are introduced by human agency. The great success of the clean milk campaign should be a stimulus to everyone to take full precautions against infection of milk and milk products in the home, from hands, droplets, flies, dust and unclean utensils. The public should also co-operate more in the care of milk bottles, by washing them after use and by ensuring that they are not used as receptacles for anything but milk.

BEVERAGES

In addition to water, and milk (which contains 87 per cent of water) many other beverages are consumed which consist largely of water. Tea and coffee contain a stimulant, caffeine, other drinks contain fruit juices and sugar. Alcohol is not a stimulant, but beer and stout have some small food value on account of their carbohydrate content.

Tea and coffee are not real foods, their use as nutrients depends on the amount of sugar and milk added to the cup. They both contain an alkaloid, thein or caffeine, a nerve stimulant which increases mental activity. Tea also contains tannin, a bitter astringent which can cause digestive disturbances: in tea which is allowed to stand for more than five minutes after infusion, the amount is much increased. Coffee beans have less alkaloid than tea leaves.

Cocoa contains 50 per cent of fat and a small amount of an alkaloid similar to caffeine, but it has no stimulant action on the brain. The high fat content may upset the digestion. **Chocolate** is a useful nutrient. It is made of cocoa, sugar, starch and fat with a flavouring agent, more often consumed in the form of a pressed cake than as a beverage made with hot water.

Soft drinks. The juices expressed from fresh fruits such as

lemons, oranges, limes and blackcurrants make pleasant drinks when diluted with water. They may also have a high vitamin C content. A preservative is often added, or pasteurization carried out, to prevent deterioration.

Mineral waters derived from natural springs containing salts in solution and carbon dioxide, were formerly bottled in large quantity. The mineral salts had a mild aperient action and the carbon dioxide a refreshing effect. Their use has now been replaced to a large extent by manufactured "minerals", consisting of water to which fruit flavouring or other substances have been added, which is aerated with carbon dioxide gas.

Visitors abroad, wisely, preferred these bottled drinks to the local water, which was so often liable to be polluted. However, when the water used in their manufacture was impure, and the bottle dirty, the drink could itself be infected. Storage for fourteen days was a precaution. Contamination with lead was also a possible danger in some places. In this country, drinks of this type are pleasant and harmless. But unfounded claims are sometimes made as to the medical and energy-producing value of both the aerated and non-aerated varieties.

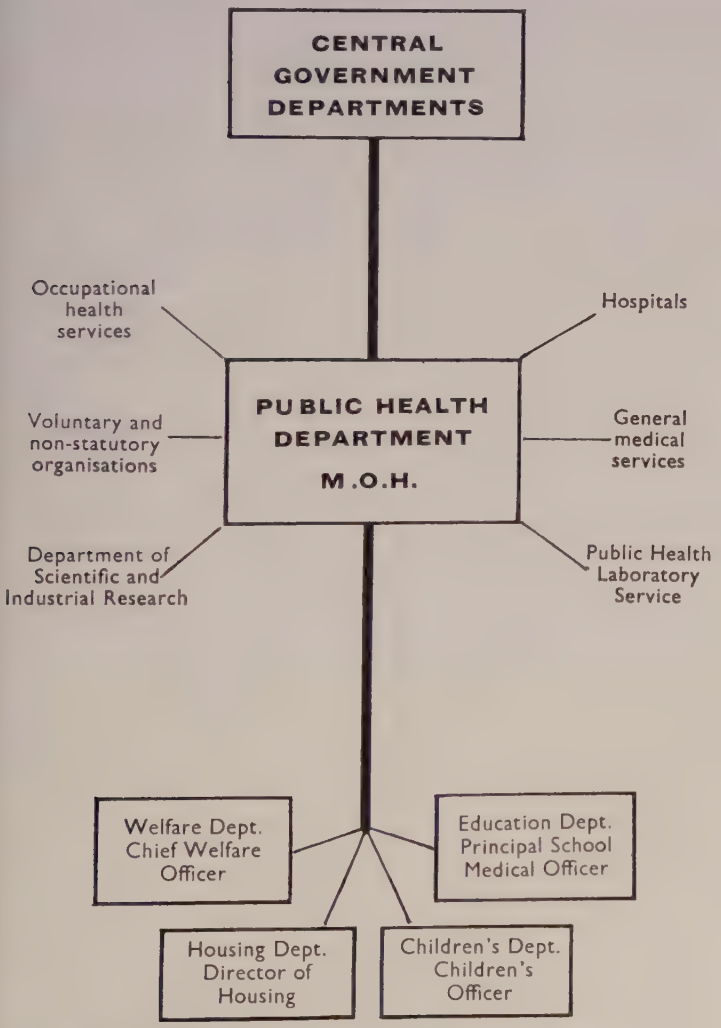
Alcohol is not really a stimulant. It causes diminished control of the body by the higher centres of the brain which results in impairment of co-ordination and judgment. It is because it can reduce tension that it is popularly called a stimulant. Absorption is rapid, without digestion, so it may have a temporary use as a food in some acute illnesses. Taken in small amounts and infrequently it can do little harm, and may stimulate the appetite or help in insomnia. The great danger is habit formation. Its action on the skin capillaries, which it dilates, gives a feeling of warmth, whereas the body is really losing heat. The social and domestic ill-effects of over-indulgence in alcohol, and its association with road accidents are too well known to need reiteration here.

Stimulants and alcohol often taken when the body is fatigued do not supply it with fresh energy; they may give the urge to carry on, but the effect is transitory. The body, tired from over-exertion, must have rest and sleep, together with suitable nourishment (*see page* 134).

APPENDIX

LOCAL AUTHORITY SERVICES

1. LIAISON

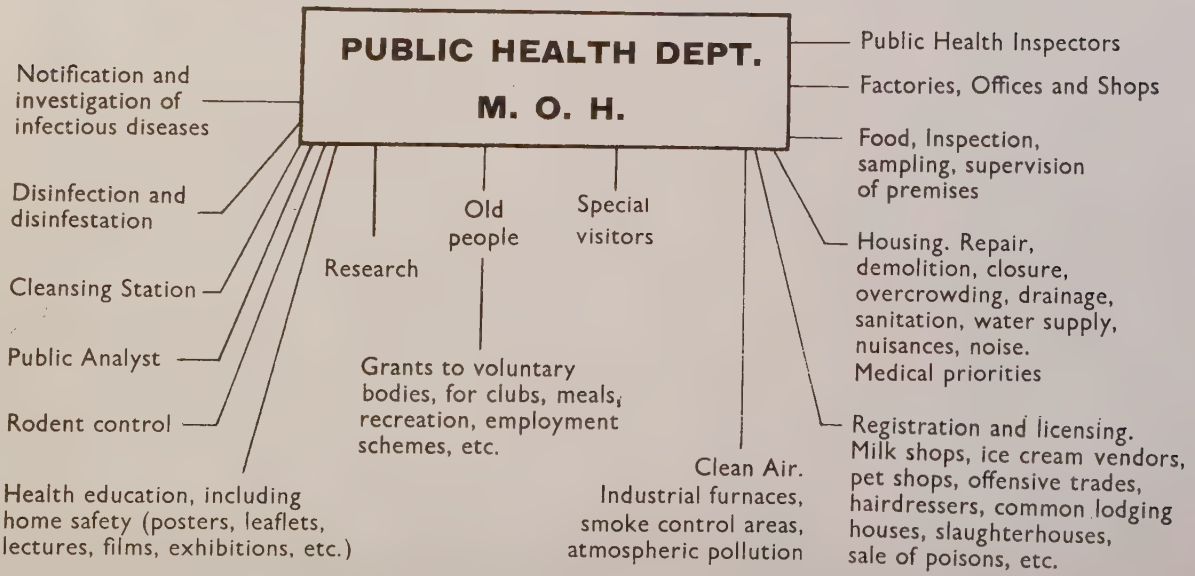


(a) The M.O.H is Generally the Principal School Medical Officer.
(b) The Health and Welfare Departments are often combined.

2. FUNCTIONS

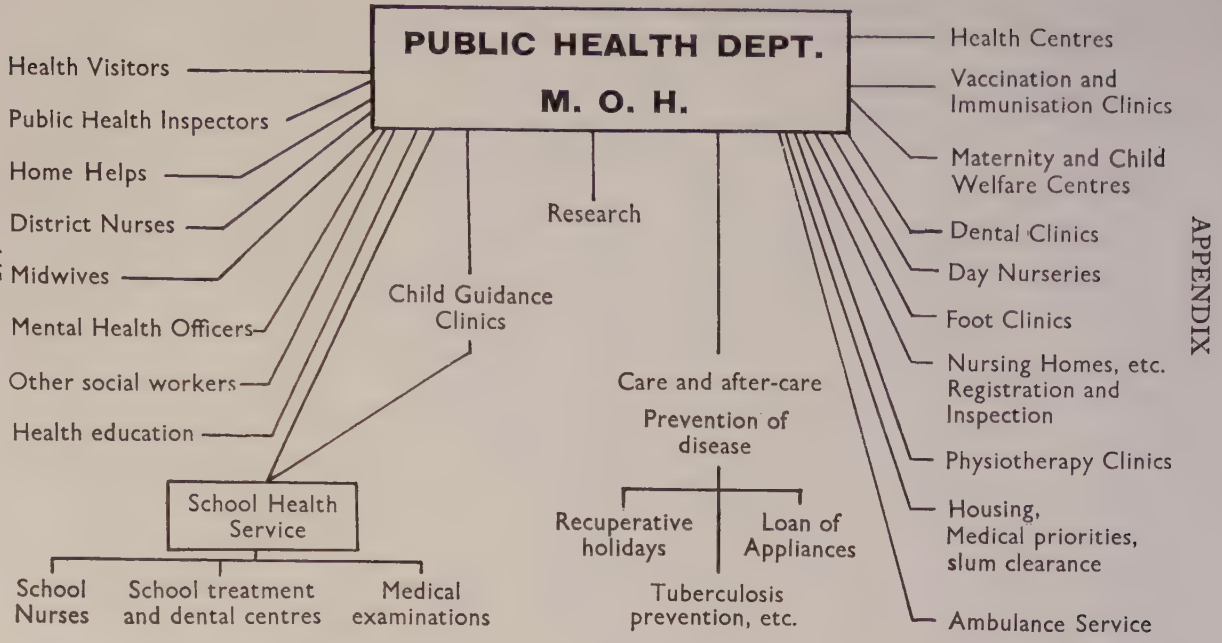
A. ENVIRONMENTAL HEALTH (Borough & District Councils).

Public Health Acts, Housing Acts, Food and Drugs Act, Clean Air Act, etc.



Some Councils act as Port Health Authorities.

B. PERSONAL HEALTH (County & County Borough Councils).
National Health Service Act, Education Acts, etc.



REVISION PERIOD

Suggestions for revision and further discussion

What is positive health?

What do we mean when we speak of PERSONAL and COMMUNAL HYGIENE?

How does the ENVIRONMENT influence health?

What are the SOCIAL aspects of illness?

Discuss the care of the handicapped and REHABILITATION.

Why is the welfare of old people so important nowadays? How are they helped?

Discuss some of the properties of clothing.

Why is correct clothing so important?

What is the importance of body cleanliness?

What is the value of exercise?

What are the aims of HEALTH EDUCATION? How are they carried out?

How can communicable diseases be prevented? Discuss the care of the teeth.

How does the body protect itself against infection?

How can body resistance be raised?

What is artificial immunity? Give examples.

How do insects play a part in transmitting infection? What part is played by rats?

What are the properties of the new insecticides?

Discuss insect control.

What are the main causes of illness and death today?

What should be done to reduce their incidence?

Discuss the prevention of food infection.

How does housing influence health?

What are the essentials of a good house?

Why is ventilation so important?

What diseases are carried by: 1, water; 2, milk?

What steps are taken to provide pure water and clean milk?

What are the main constituents of food? What are their functions in the body?

How may food be contaminated? What measures should be taken to prevent it?

Describe the methods of preserving food.

What is the importance of atmospheric pollution? How is it caused? How may it be prevented?

What are the effects of noise on health?

How can atomic energy be used in the service of man?

What is the value of an occupational health service?

Give the important principles in camp hygiene.

Discuss sanitation in temporary camps.

How are the public health services organised?

How is athlete's foot caused? What are the preventive measures?

How can the public assist in community health?

Discuss the importance of home and family life in maintaining normal health.

What are the present-day attitudes to the care of the mentally ill?

SUGGESTED FURTHER READING

Active Alerted Posture by W. E. Tucker
(E. & S. Livingstone Ltd., price 10/6)

Age is Opportunity. The National Council for Social Services
(National Old People's Welfare Council, price 8/6)

All About Asthma by Wilfred Benson, M.D.
(Family Doctor Booklet, price 1/- from Chemists)

Almost All About Diabetes by R. D. Lawrence, M.D., F.R.C.P.
(Family Doctor Booklet, price 1/- from Chemists)

Anatomy, Physiology and Hygiene by A. Millicent Ashdown and E. Bleazby (Dent, price 10/6)

Animal Parasites in Man by Geoffrey Lapage (1957 Pelican Book)

Care of the Dying by Dr. Cicely Saunders (Macmillan, price 2/-)

Child Welfare by the St. John Ambulance Association (price 3/9)

Clean Air (Family Doctor Booklet, free of charge)

Common Sense Cooking and Eating by Joan Robins (Odhams, price 7/6)

Complete Cookery Book for Diabetics by Iris Holland Rogers for British Diabetic Association (from H. K. Lewis, price 6/-)

Cooking and Eating for Health by John Clyde, M.A., M.D., Ph.D., B.Sc., Alan Porter, M.B., Ch.B., and Evelyn Rose
(Family Doctor Book, price 10/6)

Deprived Children by Hilda Lewis (Oxford University Press, price 9/6)

Encyclopædia of Family Health (National Magazine Co., price 45/-)

Epidemic Diseases by A. H. Gale (1959 Pelican Book, price 3/6)

Family Life and Old People by Peter Townsend
(Routledge & Kegan Paul, price 30/-)

Family Welfare Centre by Nancy Lingard, Margaret Platt, Barbara Oldham (Family Welfare Centre, price 5/-)

Food for the Family by Harvey Flack, M.D.
(Family Doctor Booklet, price 1/- from Chemists)

Health of Executives, The (1961, price 15/-)

Heart Disease and High Blood Pressure by K. C. Hutchin, M.D.
(Foyles, price 4/-)

Help for the Tuberculous (2nd edition 1954, price 5/-)

Hospital and Community by Thomas Ferguson and A. N. MacPhail
(Oxford University Press, price 9/6)

Infectious Diseases of Childhood by T. Anderson, M.D., F.R.C.P.(E)
(Family Doctor Booklet, price 1/-)

Occupational First Aid by the St. John Ambulance Association

Our Advancing Years by Trevor Howell (Phoenix House, price 16/-)

Poise and Relaxation by Charles A. Neil
(Family Doctor Booklet, price 1/- from Chemists)

Psychology of Everyday Living, The by Dr. Eustace Chesser
(Family Doctor Book, price 10/6)

Radiation and Health by Williams, Smith Chalke
(1962, Longmans, price 28/-)

Smoking—The Dangers by Harvey Flack, M.D.
(Family Doctor Booklet, price 1/- from Chemists)

Smoking and Health: A Report of the Royal College of Physicians
(1962, Pitman Medical Publishing Co. Ltd.)

Social Work in Tuberculosis by Margaret Coltart (1959, price 12/6)

Whys and Wherefores in Tuberculosis by George Day (1955, price 3/6)

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NOTES